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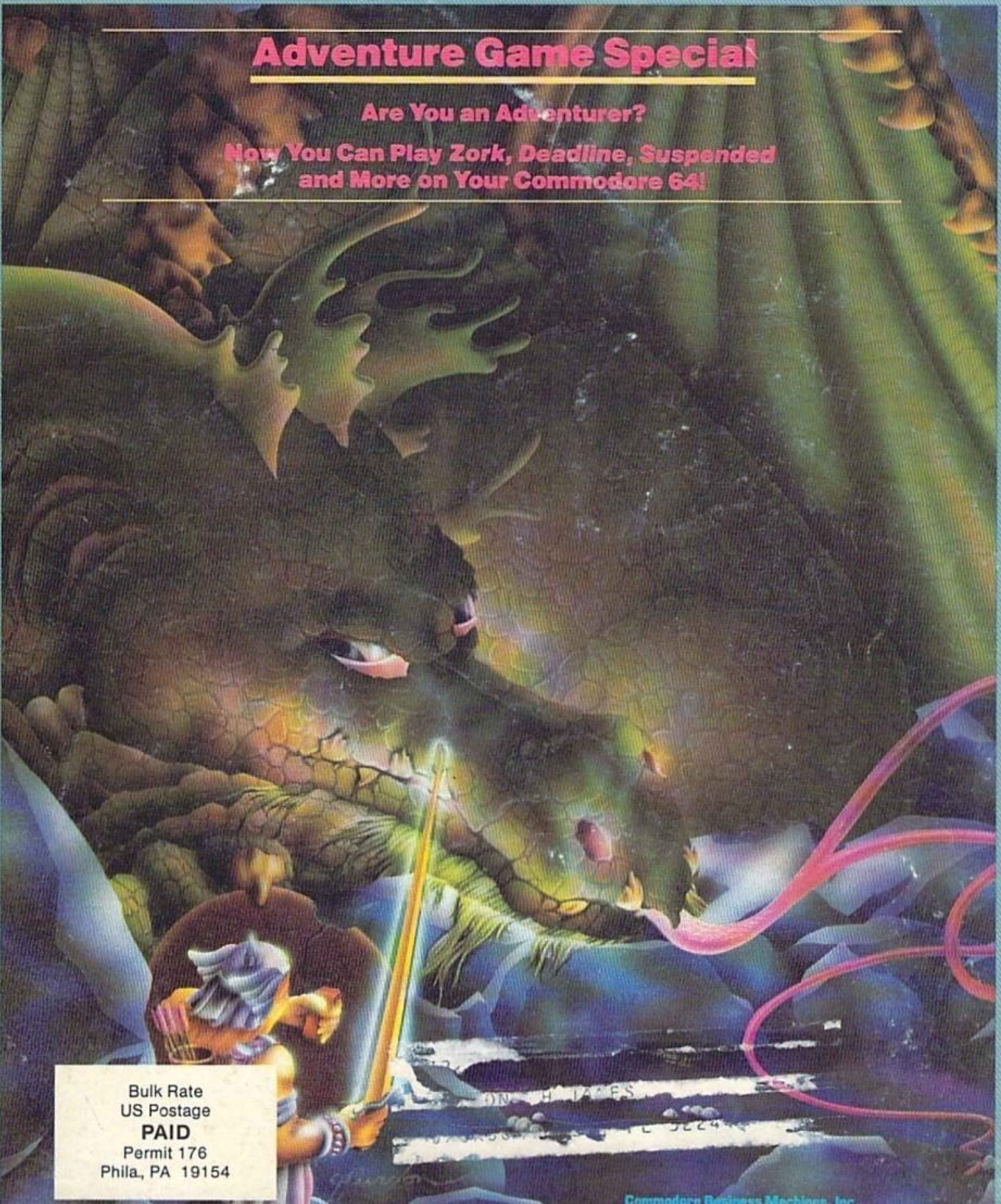

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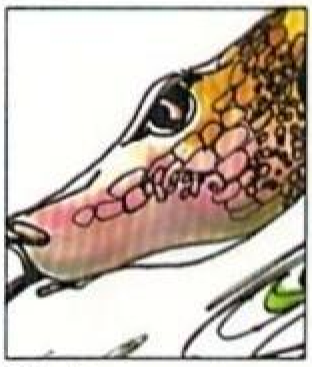
Adventurer?


Sixty-four

Resolution

34 Are You an Adventurer? by Diane LeBold
If you like mystery novels, fantasy games or logic puzzles, you're likely material for adventuring. In addition to the Scott Adams adventures already available for the VIC 20, Commodore now has four challenging "participatory novels" to delight (and frustrate) our Commodore 64 users.

42 Four for the Sixty-four by Steve Finkel
Four new action games for the Commodore 64 will keep your eye-hand coordination honed and your reflexes tuned. Can YOU survive??

50 Saving High Resolution Screens by Jim Gracely
Last issue Jim explained how to create bit-mapped graphics on your Commodore 64. Now you find out how to save your best screens, so you can recall them any time you want.

56 Making Friends with SID, Part 4 by Paul Higginbottom
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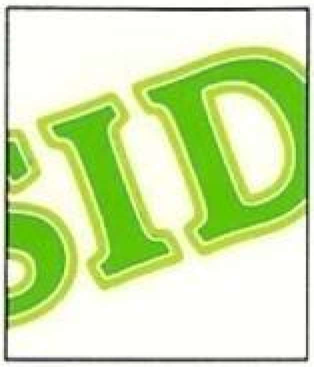

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Coming Next in Commodore's User Magazines

Commodore: the Microcomputer Magazine. Issue 26 (October/November): Features the latest software under development at Commodore. Find out about the fantastic Super Expander for the Commodore 64, Simon's BASIC, VICTerm 40 telecommunications software and much more.

Power/Play. Winter: Our Christmas special will feature the hottest gift ideas for all your Commodore friends and relatives. Plus more games, more home applications, more on Commodore kids, more programming tips for beginners. Look for us in early November.

Key to Entering Program Listings

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"[F1,F2,F3,F4,F5,F6,F7,F8]":F1,F2,F3,F4,
  F5,F6, F7 AND F8
"[POUND]":ENGLISH POUND
"[PI]"PI SYMBOL
"^":UP ARROW
"[HOME]":UNSHIFTED CLR/HOME
"[CLEAR]":SHIFTED CLR/HOME
"[RVS]":REVERSE ON
"[RVOFF]":REVERSE OFF
"[BLACK,WHITE,RED,CYAN,MAGENTA,GREEN,BLUE,
  YELLOW]" THE 8 CTRL KEY COLORS
"[ORANGE,BROWN,L. RED,GRAY 1,GRAY 2,L.
  GREEN,L. BLUE, GRAY 3]":THE 8
  COMMODORE KEY COLORS (ONLY ON THE 64)
GRAPHIC SYMBOLS WILL BE REPRESENTED AS
  EITHER THE LETTERS SHFT (SHIFT KEY) AND
  A KEY:"[SHFT Q,SHFT K,SHFT V,SHFT T,
  SHFT L]"
  OR THE LETTERS CMDR (COMMODORE KEY) AND
  A KEY:"[CMDR Q,CMDR H,CMDR S,CMDR N,
  CMDR O]"
IF A SYMBOL IS REPEATED, THE NUMBER OF
  REPITITIONS WILL BE DIRECTLY AFTER THE
  KEY AND BEFORE THE COMMA:"[SPACE3,
  SHFT S4,CMDR M2]"
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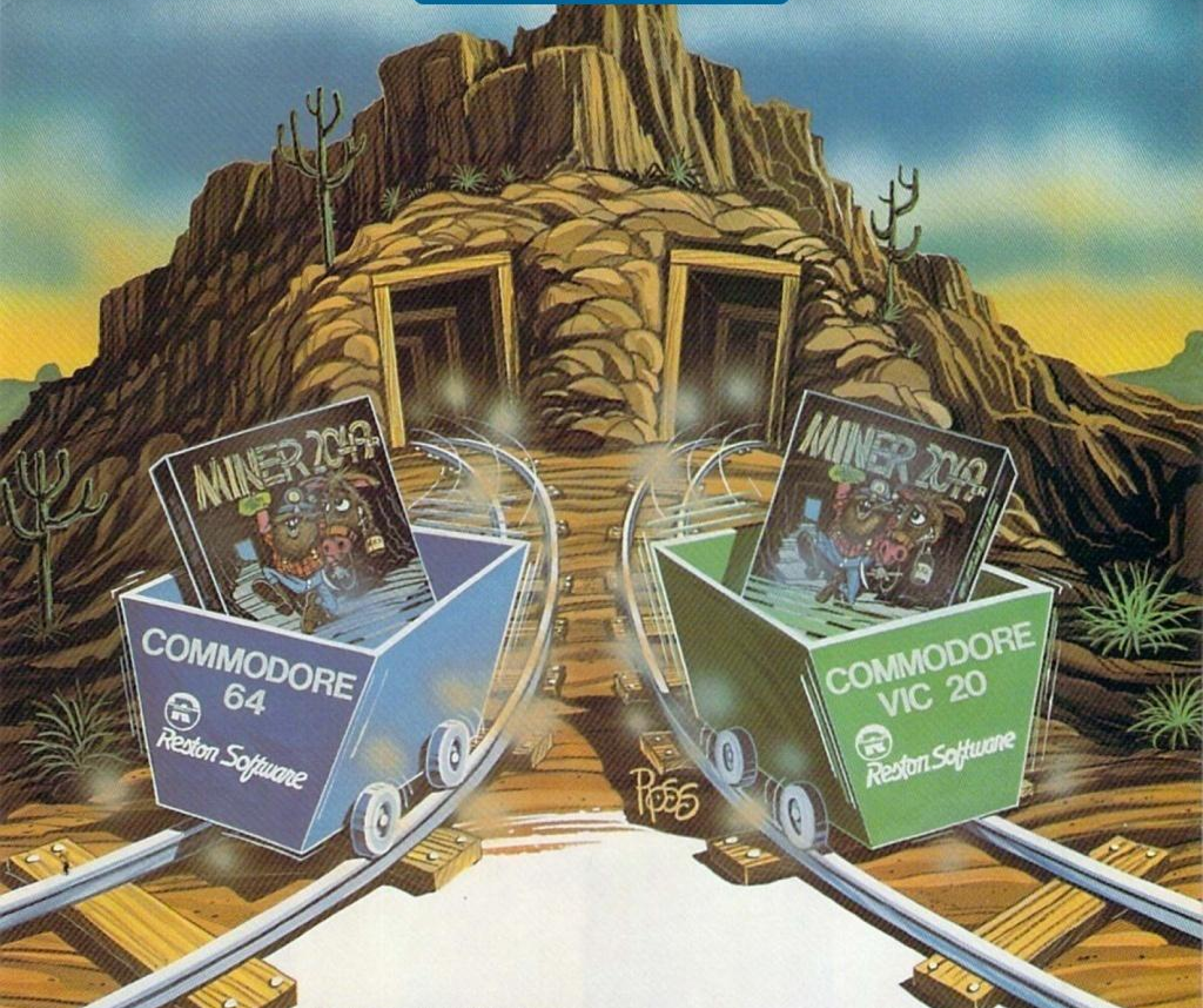

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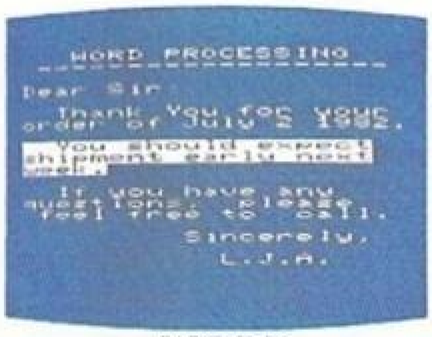
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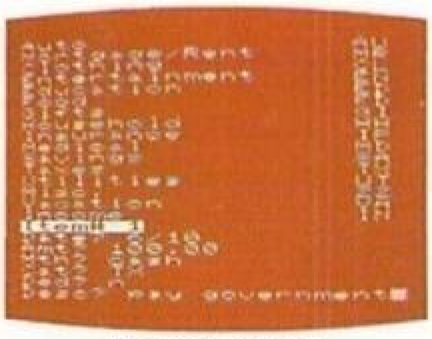
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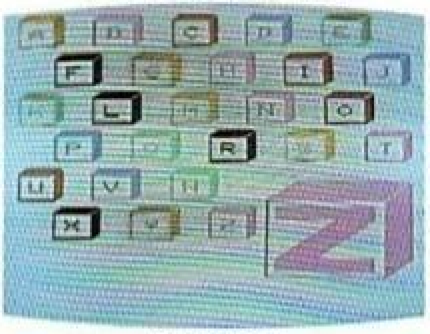
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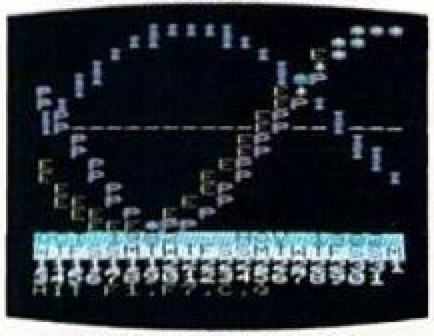
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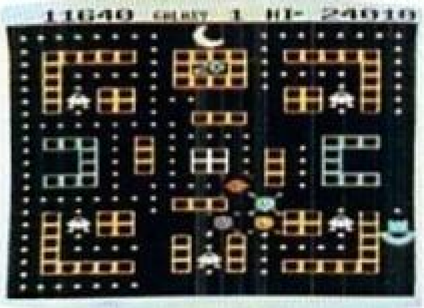
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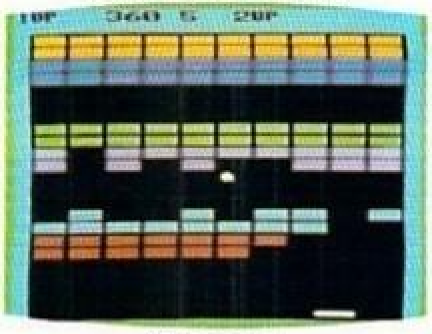
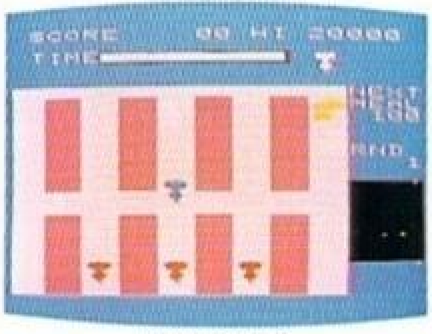

SUPER SMASH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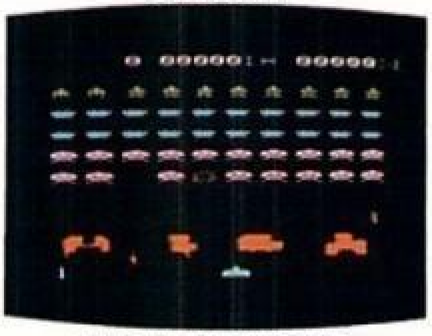
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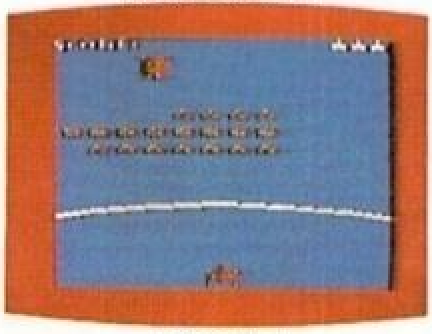
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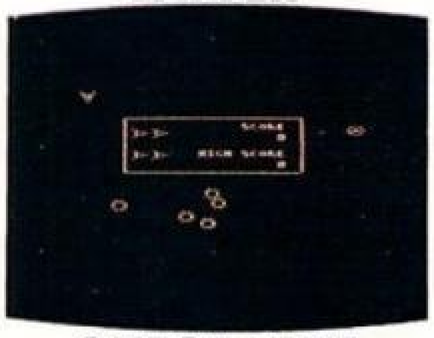
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It connects your telephone to your VIC 20™ or Commodore 64™ computer (resulting in something aptly called telecomputing), giving you access to information such as you see on the screens to your right.

Normally, you'd have to type a short program into your computer to help it make the final transition into a telecomputer.

However, when you buy a VICMODEM, you'll find we've included a free software program. You just load it into your Commodore Datassette Recorder, and presto (give or take a moment or two), you have access to a vast library of information and games.

Speaking of free, Commodore also includes a free subscription and a free hour's time on CompuServe™ and Dow Jones News/Retrieval Service,® a free trial offer on The Source,℠ and a discount program offer with Comp-U-Store and General Videotex Corp.

Let's see. Did we leave anything out? Oh, yes. Along with CompuServe comes a free membership in the Commodore Information Network. This is your HOTLINE to Commodore. (How often do you get to speak directly to a manufacturer?) Through it we

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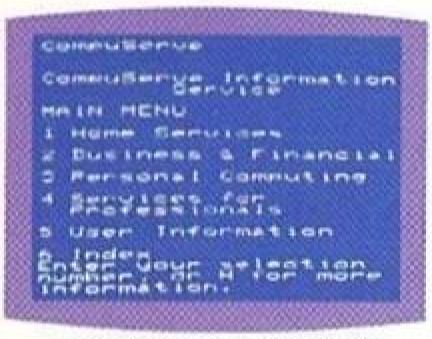

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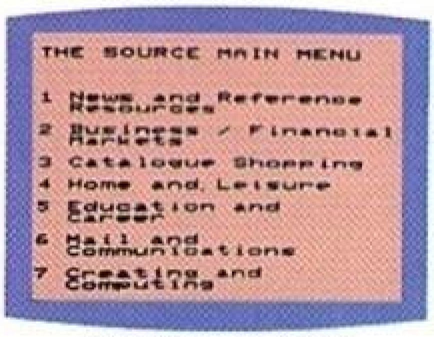

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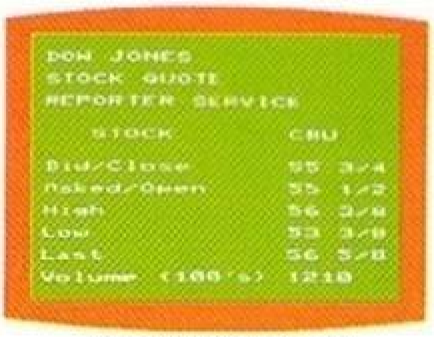

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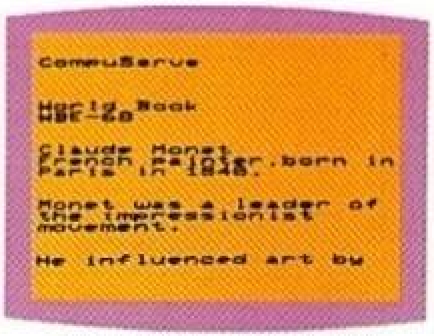

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Claude Monet
French painter, born in
Paris in 1840.

Monet was a leader of
the impressionist
movement.

He influenced art by
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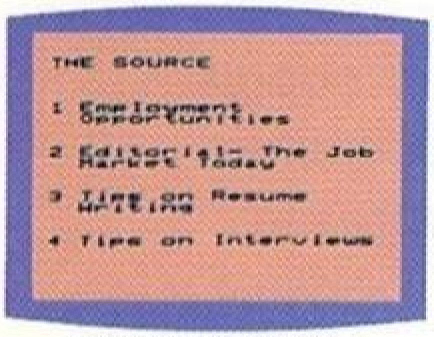

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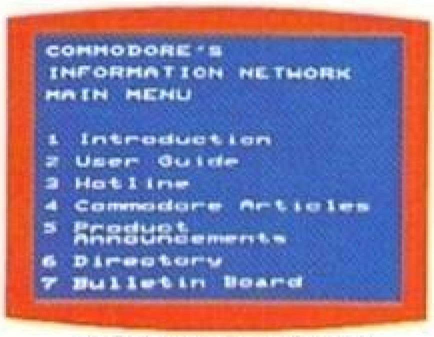

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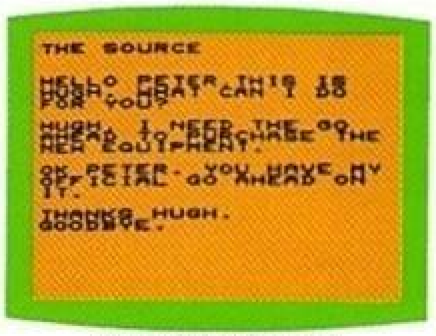

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THE SOURCE

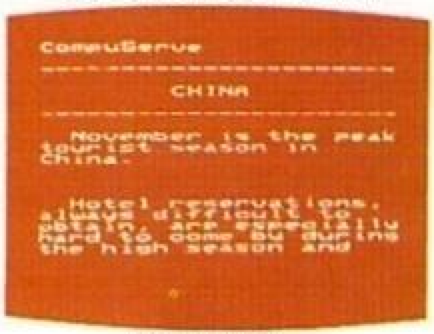
HELLO PETER. THIS IS
HUGH. WHAT CAN I DO
FOR YOU?

HUGH, I NEED THE OK
AHEAD TO PURCHASE THE
NEW EQUIPMENT.

OK PETER. YOU HAVE MY
OFFICIAL GO AHEAD ON
IT.

THANKS, HUGH.
GOODBYE.
```

ELECTRONIC MAIL



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CompuServe
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            CHINA
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  November is the peak
tourist season in
China.

  Hotel reservations,
always difficult to
obtain, are especially
hard to come by during
the high season and
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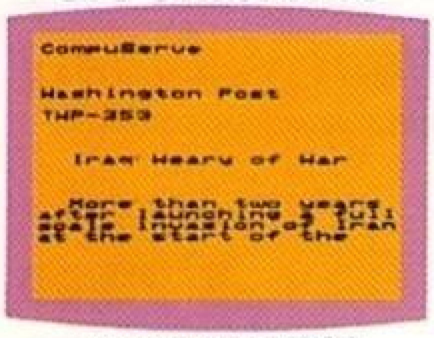

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Washington Post
TWP-353

  Iraq Weary of War

  More than two years
after launching a full
scale invasion of Iran
at the start of the
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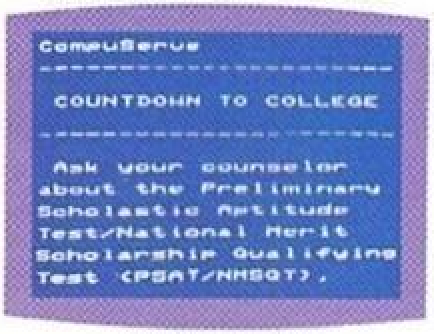
WIRE SERVICE NEWS



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Test (PSAT/NMSQT).
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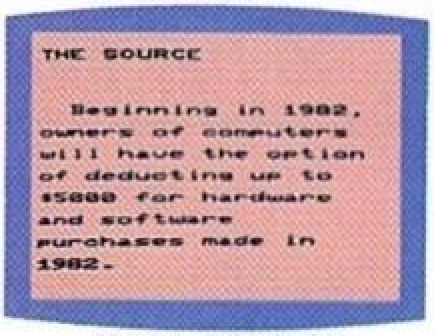

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will have the option
of deducting up to
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and software
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1982.
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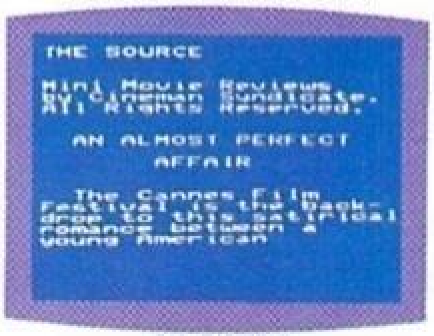

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THE SOURCE

Mini Movie Reviews
by Cineman Syndicate.
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  AN ALMOST PERFECT
       AFFAIR

  The Cannes Film
Festival is the back-
drop to this satirical
romance between a
young American
```
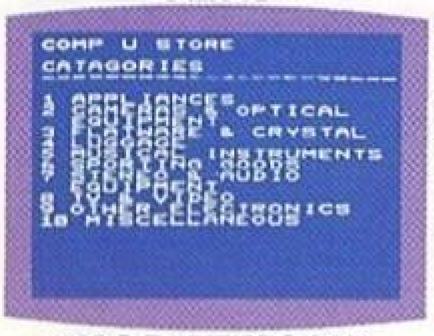

MOVIE REVIEWS



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9 OTHER ELECTRONICS
10 MISCELLANEOUS
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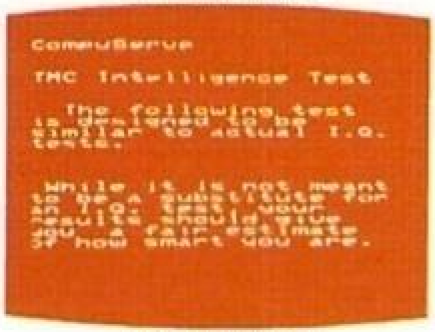

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TMC Intelligence Test

  The following test
is designed to be
similar to actual I.Q.
tests.

  While it is not meant
to be a substitute for
an I.Q. test, your
results should give
you a fair estimate
of how smart you are.
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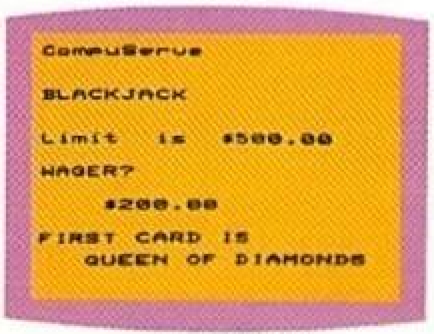
I.Q. TESTS



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WAGER?

    $200.00

FIRST CARD IS
   QUEEN OF DIAMONDS
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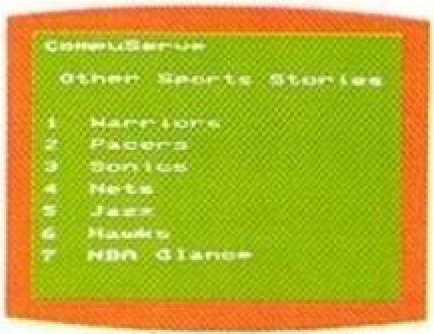

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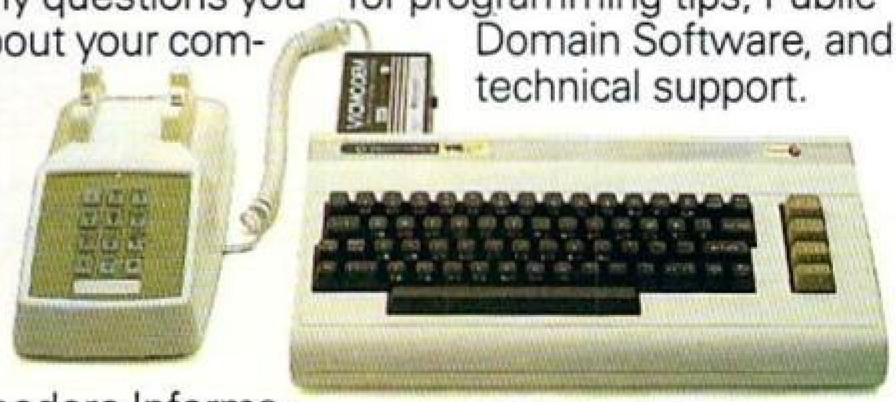
 Other Sports Stories

1  Warriors
2  Pacers
3  Sonics
4  Nets
5  Jazz
6  Hawks
7  NBA Glance
```

SPORTS NEWS

can answer any questions you might have about your computer, or programming, or anything else Commodore-related, via electronic mail.

The Commodore Information Network is also your direct line to the Commodore Bulletin Board, which Commodore owners use to keep in touch with each other, for programming tips, Public Domain Software, and technical support.



THE COMMODORE VIC 20, A REAL COMPUTER FOR THE PRICE OF A TOY.

Altogether, these little extras we've included with our VICMODEM add up to a value of $197.50. A nice return on an investment of around $100.

Some computer companies think it's reasonable to ask as much as $500 for telecomputing capabilities such as ours.

However, with the Commodore VICMODEM selling for around $100, we feel we're being a whole lot more reasonable. Don't you agree?

commodore COMPUTER

These are just a few examples from our existing library of software available for the VIC 20. U.S.A.–P.O. Box 500, Conshohocken, PA 19428; Canada–3370 Pharmacy Avenue, Agincourt, Ontario, Canada M1W 2K4.

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- 80 Columns × 24 lines
- Green text display
- East to read - no eye strain
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- High resolution graphics
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- Attractive metal cabinet
- UL and FCC approved

- *15 Day Free Trial - 90 Day Immediate Replacement Warranty*

9" Screen - Green Text Display	$ 79.00
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12" Screen - Amber Text Display (anti-reflective screen)	$119.00

Display Monitors From Sanyo

With the need for computing power growing every day, Sanyo has stepped in to meet the demand with a whole new line of low cost, high quality data monitors. Designed for commercial and personal computer use. All models come with an array of features, including upfront brightness and contrast controls. The capacity 5 × 7 dot characters as the input is 24 lines of characters with up to 80 characters per line.

Equally important, all are built with Sanyo's commitment to technological excellence. In the world of Audio/Video, Sanyo is synonymous with reliability and performance. And Sanyo quality is reflected in our reputation. Unlike some suppliers, Sanyo designs, manufactures and tests virtually all the parts that go into our products, from cameras to stereos. That's an assurance not everybody can give you!

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How to Use the VIC's Programmable Function Keys

To the Editor:

There has been much said about those mysterious function keys. I have seen many ways to use them and address them. Most were very awkward and, when used, tended to make one never want to use them again. However, I have used them in a different way and have had good results.

In all I have read, you always use the CHR$ function with the function keys. Well, I have been using these same keys in the same way you would use any other variable. Take an A or I or a Z. You don't use CHR$ to test for these with a GET statement, so why would you do it with the function keys? Just think of each function key as a simple variable. I would use it like this:

```
100 GET A$:IF A$=""THEN
    100
110 IF A$="[F1]"THEN500
120 IF A$="[F3]"THEN600
130 IF A$="[F5]"THEN700
```

This has worked for me just as if I had used IFA$="A" or IFA$="I" or any other variable. Just type the F1-F8 keys as regular variables. Try it and see how easy it is to use this way.

David C. O'Sada
Jacksonville, Florida

A Printer Routine for Subroutines

To the Editor:

In the process of writing a very long program, I needed a way to list the separate subroutines on the printer. Luckily, I had room for a routine to do this. Here's how it works.

When run, the program asks for three inputs from the user: title of routine, starting line number and ending line number. The listing of this routine is a sample output. Notice that the line numbers are included in the title.

First, leave room somewhere for the routine in your program. I chose to put it at the very beginning and call the routine simply by typing RUN. If I want the rest of the program to run, then I type RUN 100.

Then (easy as pie), answer the prompts. When the screen clears and the printer stops, hit RETURN. When the printer stops again, hit RETURN to close the file.

On yes, I almost forgot. I LOVE my Commodore 64!

Lenton K. Goforth
Brea, California

Printer Routine

```
5 PRINT"[CLEAR,DOWN4]"
10 PRINT"[RVS]PRINTER[SPACE]OUTPUT[RVOFF]"
20 PRINT:PRINT"PAGE[SPACE]TITLE";:INPUT PT$
25 PRINT:PRINT"STARTING[SPACE]LINE[SPACE]
   NUMBER";:INPUT SL
30 IF SL=0 THEN 25
35 PRINT:PRINT"ENDING[SPACE]LINE[SPACE]
   NUMBER";:INPUT EL
40 IF EL=0 THEN 35
45 PRINT"[DOWN3,SPACE5]PLEASE[SPACE]ADJUST
   [SPACE]PAPER[SPACE]IN[SPACE]PRINTER"
50 PRINT"[DOWN]HIT[SPACE,RVS,SPACE]F1[SPACE,
   RVOFF,SPACE]WHEN[SPACE]READY"
55 GET A$:IF A$=""THEN 55
60 IF A$<>CHR$(133)THEN 50
65 OPEN 4,4,0:CMD 4:PRINT CHR$(14);"[SPACE3]
   "PT$;"[SPACE6]LINES"SL"-"EL;CHR$(15)
70 PRINT#4:CLOSE 4
72 PRINT"[CLEAR,DOWN7]"
75 PRINT"OPEN4,4,6:CMD4:LIST"SL"-"EL
80 PRINT"PRINT#4,:CLOSE4"
85 PRINT"[UP6]";
90 PRINT"[SPACE3,RVS,SPACE3]HIT[SPACE]RETURN
   [SPACE3]"
95 END
100 REM **** START OF REST OF PROGRAM ****
```

Alice in Adventureland

Some people can't hack adventure games. They get too frustrated by the crazy, convoluted logic and the limitations intrinsic to each game. Maybe they need to be entertained by graphic wonders on their screens, rather than (ugh!) just *words*. Or maybe they prefer to get physically involved—bouncing around in their chairs, elbows flapping, tongues lolling out, feet dancing to the erratic rhythm of alien ray guns as they wrestle with a joystick, maiming freaky little creatures—rather than just sitting there thinking and drawing maps.

Not me. I've always been susceptible to words. It seems to have come with the territory, from the time my mother used to chase me out of the house (I think I was eleven) with the threat that my eyes would fall out if I read any more and I needed the fresh air, anyway; right up until now, when my eyes feel like they WILL fall out from sitting in front of my CRT for hours. Words and I have gone a lot of places—down rabbit holes, into enchanted gardens, across the forbidden thresholds of magic theaters. So I guess it was natural for somebody like me to take to adventuring.

That's why this issue has been great fun. It gave me an unavoidable reason to sit down and play adventure games again—something I don't usually dare to do unless I plan not to see anybody or go anywhere for a couple of weeks. If you have that kind of head, I'll bet you're a potential adventurer yourself. Take a look at our adventure feature in this issue to verify.

And now for an important announcement. WE'VE CHANGED OUR PROGRAM LISTING FORMAT!! Now, instead of the reverse graphic symbols that have caused frustration for many of our new programmers, we have nice, legible letter-quality WORDS that tell you which keys to press. This should delight all of you who have been having problems translating those sometimes only semi-legible reverse graphic symbols.

In our new format, the words in brackets tell you which keys to press. When you press the appropriate keys you'll see those nasty graphic symbols appear on your screen—but they'll be the *correct* symbols, which is usually essential if you want your program to run right. Thanks to Jim Butterfield, who invented the program that translates those symbols into words, and to Jim Gracely, who modified it to suit our needs even better. A listing of the bracketed words and what they mean appears on page 4.

Our new Kids' Corner department keeps growing, thanks to Betsy Byrne's tireless efforts. I'm astonished (and so are some of our grown-up programmers) at some of the work you kids are doing. Even kids as young as ten year-old Josh Rai are writing programs that we adults would have a hard time thinking up, let alone actually getting to work.

Also in this issue you'll find another enlightening article about LOGO by Mr. Turtle himself, David Malmberg. This time you'll find out how you can use LOGO, which will soon be available for the Commodore 64, to create your own LOGO lander game.

Next issue will be our Christmas special. If you plan to buy presents for your computer-using friends and relatives, the Winter *Power/Play* should help solve some of your Christmas shopping problems. I almost hate to mention Christmas so soon, but you know it always manages to sneak up on us some time before the end of the year, so you may as well plan to do it up right. Ho Ho. C

—Diane LeBold
Editor

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we're glad you asked

Our technical editor, Jim Gracely, answers readers' questions.

Q I can't locate a table with the PEEK(197) key codes for the Commodore 64. I have looked in both the user's guide and the *Programmer's Reference Guide* and cannot find the information in either of them. Can you help?

A It seems that somewhere along the way someone forgot all about that table. Don't fret however, because here it is:

#	KEY	#	KEY	#	KEY	#	KEY
0	[INST]	17	R	34	J	51	[CLEAR]
1	[RTRN]	18	D	35	0	52	[RIGHT SHIFT]
2	[CRSR R]	19	6	36	M	53	=
3	[F7]	20	C	37	K	54	↑
4	[F1]	21	F	38	O	55	/
5	[F3]	22	T	39	N	56	1
6	[F5]	23	X	40	+	57	←
7	[CRSR D]	24	7	41	P	58	[CNTRL]
8	3	25	Y	42	L	59	2
9	W	26	G	43	-	60	[SPACE]
10	A	27	8	44	.	61	[CMDR]
11	4	28	B	45	:	62	Q
12	Z	29	H	46	@	63	[RUN/STOP]
13	S	30	U	47	,	64	NO KEY
14	E	31	V	48	[POUND]		
15	[SHFT]	32	9	49	*		
16	5	33	I	50	;		

#	KEY	#	KEY	#	KEY	#	KEY
0	[INST]	17	R	34	J	51	[CLEAR]
1	[RTRN]	18	D	35	0	52	[RIGHT SHIFT]
2	[CRSR R]	19	6	36	M	53	=
3	[F7]	20	C	37	K	54	↑
4	[F1]	21	F	38	O	55	/
5	[F3]	22	T	39	N	56	1
6	[F5]	23	X	40	+	57	←
7	[CRSR D]	24	7	41	P	58	[CNTRL]
8	3	25	Y	42	L	59	2
9	W	26	G	43	-	60	[SPACE]
10	A	27	8	44	.	61	[CMDR]
11	4	28	B	45	:	62	Q
12	Z	29	H	46	@	63	[RUN/STOP]
13	S	30	U	47	,	64	NO KEY
14	E	31	V	48	[POUND]		
15	[SHFT]	32	9	49	*		
16	5	33	I	50	;		

Q We have tried to run "Wheel of Gold" (Spring, 1983), but consistently get an "out of memory" error in line 30, even after installing a 16K expander. Please help us!

A James Dunn, author of "Wheel of Gold", replies

"Wheel of Gold" uses a technique that protects an area of RAM from BASIC overwriting it. It stores the special character set in this area so that the VIC chip can access it. This is done by "fooling" BASIC into thinking that there is less memory than there really is. The key to this is in memory locations 55 and 56. These locations are a zero page pointer that tells BASIC where the top of memory is. "Wheel of Gold" lowers the high byte, location 56. (The normal value in location 56 is 30 if you have a 5K VIC.) This technique will also work if you have expanded memory. The value in 56 depends on how much memory you attach. Unfortunately the VIC chip cannot access the expansion memory. This means that special character sets stored in protected high memory on an expanded VIC cannot work with the VIC chip. This is why "Wheel of Gold" will not work with memory expansion.

After spending long hours typing in a program it is always best to SAVE a copy to tape or disk first before RUNning it. If it crashes and the VIC locks up, you will have no alternative but to switch the VIC off, then on. This erases the program and you will have to re-type it. The important thing to remember is that a RUN/STOP-RESTORE does *not* reset all the pointers inside the VIC 20. Locations 55 and 56 are ones that are not reset. The VIC is still "fooled". In fact, if you finish with "Wheel of Gold" and decide to load another program, you will find that memory is still less than should be.

The fix is simple however. Just POKE 56 back to its initial value (30 for unexpanded VIC). It might be a good idea to delete one of the first REM lines and replace it with POKE 56,30. That way you wouldn't have the problem re-RUNning it. You still must reset BASIC after you are through. You can do this by either turning the VIC off and on (wait at least 3 seconds between off and on) or you can type SYS64802 which will accomplish the same thing. This is called a warm start and will also erase memory. **C**

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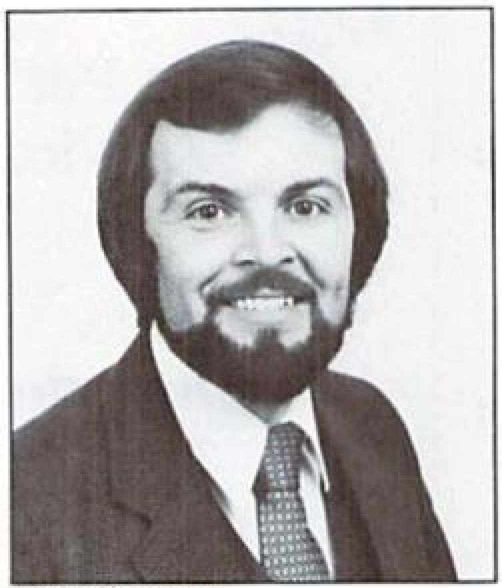
Introducing "For. . . Next" Loops

by Michael Tomczyk



Michael Tomczyk

FOR... NEXT loops are probably used more often than any other BASIC command, except PRINT. These loops are used for three purposes: 1) to insert a time delay in your program and 2) to count a series of number values, in order, and 3) to repeat an action in your program a specified number of times.

Time Delay Loops

A "time delay loop" looks like this:

```
10 FORT = 1TO200:NEXT
```

This line means, "count to 200 before going on to the next action in the program"... but the word NEXT doesn't mean "next action." It means FOR1TO200, count the NEXT NUMBER (in this case, 1,2,3, and so on up to 200). First, here's a program with NO time delay:

```
10 PRINT"VIC-20 ";
30 GOTO10
```

Type RUN/STOP to "stop" the program, then type this line and hit RETURN:

```
20 FORT = 1TO900:NEXT
```

Type LIST and hit RETURN to see your program, then type RUN and RETURN to see how it works. The time delay loop has slowed down the program... and will slow down ANY BASIC PROGRAM. You can, in fact, insert Line 20 anywhere in your BASIC programs to create time delays. Try changing 900 in Line 20 to get a longer or shorter time delay.

Counting, Counting...

The only difference between a **time delay loop** and a **counting loop** is where you put the NEXT command.

In a time delay loop, you should put the NEXT immediately after the first part of the loop. But in a counting loop, the order should be: first, the FOR part of the loop; second, the program action; and third (immediately AFTER the program action), the NEXT command. Here's an example that counts from 1 to 10 and PRINTs the numbers on the screen:

```
10 FORN = 1TO10:PRINTN:NEXT
```

You could count any series of numbers, like this:

```
10 FORN = 150TO200:PRINTN:NEXT
```

But counting is also used for other purposes. For example, you might want to make the VIC 20 move through a progression of musical note values, in order, to see how they sound. Here's how:

```
10 POKE36878,15
20 FORM = 128TO255:POKE36876,M:PRINT M
40 NEXTM
50 POKE36876,0
```

This program POKEs the VIC speaker numbered 36876 with the musical note value of M. The note value M is actually a range of numbers from 128 to 255. We defined this range in Line 20 (FORM = 128TO255). Then we POKE36876 with the value of M and at the same time we PRINT the POKE numbers that match each musical note.

Line 40 provides the NEXT command which makes the program move from 128 to 129 to 130, and so on until it reaches 255. Note that the NEXT command doesn't have to be on the same line as the FOR... part of the loop. Line 50 simply turns off the speaker.

There are numerous examples of FOR... NEXT loops being used to count values or proceed through ranges of numbers. The color program on page 34 of the VIC 20 owner's manual is another good example.

Repeating BASIC Commands

You can make a BASIC command go back and repeat over and over again using a FOR... NEXT loop. Here's an example:

```
10 FORX = 1TO10:PRINT"COUNTING":NEXT
```

Here, the important thing is to put the part you want to repeat BETWEEN the FOR and NEXT portions of the loop. This program PRINTs the word "COUNTING" 10 times on the screen.

Here's another type of counting program:

```
10 FORG = 1TO21:PRINTCHR$(166);:NEXT
```

This program line PRINTs a graphic symbol 21 times across the top of the screen. It tells the VIC 20 to PRINT the symbol represented by the CHR$ value (166). CHR$ values for all characters are shown on pages 145-147 of the owner's guide. Try substituting some other numbers. Here's another variation which gives the SAME RESULT:

```
10 FORG = 1TO21:PRINT" ▒ ";:NEXT
```

HOLD DOWN THE C= key and type "+"

Finally, how about seeing the symbols represented by all the CHR$ values? This program will do that:

```
10 FORC = 0TO191:PRINTCHR$(C);:PRINT
" [SPACE] [SPACE] " C:NEXT
```

Using More Than One Loop

You can use several FOR... NEXT loops in your programs, and even separate them... but one thing you CANNOT DO is "stagger" your loops OUTSIDE of each other. This means, if you use two loops, you must arrange your program so the loops are "nested" inside each other. The best way to demonstrate this is to show you a correctly "nested" program and an incorrect program:

CORRECT

```
10 FORA = 1TO5:PRINT"HELLO"
20 FORB = 1TO10:PRINT"GOOD-BYE"
30 NEXTB
40 NEXTA
```

INCORRECT

```
10 FORA = 1TO5:PRINT"HELLO"
20 FORB = 1TO10:PRINT"GOOD-BYE"
30 NEXTA
40 NEXTB
```

Improper "nesting" (arranging) of loops in your program will cause the VIC 20 to give you a "NEXT WITHOUT FOR" error message. You will also get this error message if you forget to put in a NEXT command after the FOR portion.

Summary

These are only a few examples using FOR... NEXT loops. Try experimenting with the formats given above and you'll find that FOR... NEXT loops will make your programming more efficient, interesting, and creative. **C**

Everybody Knows....

by Jim Butterfield

I must apologize... everything in this article is well known. Ask anybody... they'll say, "Oh, yes, everybody knows that". Silly, isn't it? These things are so well known that nobody has ever thought to mention them to you. Or perhaps you've never thought to mention them to your neighbor, since everybody knows about them.

There are so many things that everybody knows (except maybe you) that I'll need to pick a selection of the more obvious ones. I'll just touch on the subjects here.

Fuzzy Numbers.

Everybody knows that the computer cannot hold decimal fractions exactly. Within the computer, they are held as endless repeating values (just as one third is .33333.... in decimal). All you need to do to confirm this is to ask the computer to PRINT 8.13 and see what it says.

So we all know that for accounting purposes, we must beat the fuzzy number problem with careful rounding.

Everybody knows that raising to a power and taking a square root goes through a strange calculation involving logarithms and exponential functions and like that. As a result, we all know that these results are close, but not exact. We can confirm this by typing: FOR J=1 to 10:PRINT J ↑ 2:NEXT J. And we know, of course, that multiplication doesn't have this problem; so we could eliminate the above fuzzy numbers by printing J*J.

It's well known, too, that numbers that print exactly are not necessarily exact. If I ask the computer to PRINT SQR(25) it will obediently print the square root of 25, or 5. But we don't let the computer fool us; even though it printed 5 exactly, we spotted the SQR function there and know to be suspicious. Sure enough, PRINT SQR(25)−5 confirms it; instead of getting zero, we get a very small number.

By the way, we all know about those numbers with the letter E in them. If the E is followed by a plus sign, it's a very large number; if the E is followed by a minus sign, it's a very small number. E stands for "exponent notation" which is the same as "scientific notation" on calculators... but that's well known, of course. If you ask the computer to PRINT .00000000123, we'll see the number repeated back in E-notation. But we all knew about that, of course.

So we know to watch for testing for equal on a number that's been through a "fuzzy" process. In other words, we must not code IF SQR(25)=5... the computer will probably not find the two values equal. Instead of testing for "equal", we should test for "very close" with something like IF ABS (SQR(25)−5)<.0001... and we'll get good results. But you know that already, of course.

The RETURN Action

It's intuitively obvious to the most casual observer that the RETURN key should have been called the "DO IT" key. When you press that key, you're telling the computer to do, or execute, whatever is on the line you're leaving. That's all well and good; after you type in a command, you want the computer to do it.

There are times, however, when you don't want a line executed (except, perhaps, by firing squad). Perhaps you've been drawing a dreaded Grunk, or part of it, on the computer screen and want to continue to the next part of the screen. Perhaps you've been trying to correct a line of BASIC and botched it... which sometimes happens if you get into the programmed cursor mode. Maybe you were typing a program into your computer, and when somebody phoned, you just typed the message onto a spare part of the computer screen. You don't want the computer to try to do whatever is on the screen. You just want to exit to the next line without doing anything.

And you know, of course, that the way to abandon the current line is to hold down the SHIFT key and press RETURN. Shifted

RETURN might be considered the "DON'T DO IT" key. It can get you out of a lot of messy situations.

Garbage Collection

Everybody knows that certain kinds of strings can involve you in a nasty delay that happens at unpredictable times. If you didn't know about it, you might think that your machine has "crashed", since it goes silent and won't respond to the RUN/STOP key.
Try the following program:

```
100 DIM A$(500)
110 FOR J=1 TO 500
120 A$(J)=STR$(J)
130 NEXT J
```

Now, RUN the program; it will take seven seconds or so to complete. After you do so, type as a direct statement:

```
PRINT "THERE ARE";FRE
     (0);"BYTES FREE"
```

We all know that garbage collection will be invoked, and it will take this line almost twenty seconds to complete printing. During the pause, the RUN/STOP key will have no effect. You'll see little or no pause if you have a PET/CBM which comes with a 4.0 BASIC; but, of course, you knew that already.

And it's well known that doubling the number of strings can multiply garbage collection delays by four. Try changing 500 to 1000 in the above program, for example; as expected, you'll see the delay increase to over a minute.

Of course, we know that there are methods of combatting garbage collection delays. There isn't room to discuss them here; but once we know to look for garbage collection delays, we can often sidetrack them.

Conclusion

You knew all this, of course, plus lots of other fairly obvious bits of information. But here's the funny part: you never thought to mention any of them to your neighbor or classmate or fellow club member. After all, everybody knows....

It turns out that there are lots of people who have never heard about such things. Because nobody thought to tell them what is obvious... to themselves. C

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Congratulations to Commodore Challenge Contest Winners

R.M. McDonough, Jr. of Panama City, Florida for *Spider Rescue*

Honorable Mention goes to:
Juan Rivero of Hurlburt AFB, Florida, for *Starfortress*

Thanks to all of you who submitted programs. They were all, as usual, great fun. (We never seem to have any problems getting volunteer judges for this department, for some reason.) And keep up the good work. Maybe next time the winner will be you.

The Commodore Challenge
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If you've been playing around at home developing original games and programs for your unexpanded VIC 20, send your best—on cassette or disk, please—to the Commodore Challenge contest. Include a brief description of the program's purpose, including documentation on how to use it. If it's a game, be sure to include instructions.

Programs requiring memory expansion are eligible, too, but will not be published unless space allows.

Winners will receive a VIC 20 8K Memory Expander Cartridge. All entries become the property of Commodore Business Machines, Inc., upon submission. Winning entries published by POWER/PLAY will become public domain software.

Fill out the entry form below, and submit it with your game or program to:

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Signature ______________________

Parent's signature, if contestant is minor ______________________

Void Where Prohibited

Spider Rescue

by R. M. McDonough, Jr.

In order to fit this program into your VIC 20 type the first part (Spider Intro) and SAVE. Then type the second part (Spider Rescue) and SAVE. The second part will load automatically after you RUN the first part. C

Spider Intro

```
0 PRINT"[CLEAR,RIGHT4,DOWN,GREEN,RVS]SPIDER[SPACE]RESCUE",
  "[DOWN,RIGHT3,BLACK]BY[SPACE]R.M.MCDONOUGH"
1 PRINT"[DOWN2]USE[SPACE]JOYSTICK[SPACE]TO[SPACE]GUIDE","
  [RIGHT]YOUR[SPACE]BRAVE[SPACE]SOLDIER","TO[SPACE]RESCUE
  [SPACE]THE[SPACE]HOSTAGES"
2 PRINT"[RIGHT2,UP]BY[SPACE]TOUCHING[SPACE]THEM"
3 PRINT"[DOWN,RIGHT2]BEWARE[SPACE]OF[SPACE,RED]SPIDERS","
  [BLACK,RIGHT4]LURKING[SPACE]ABOUT"
4 PRINT"[DOWN,MAGENTA]THEY[SPACE]CAN[SPACE]BE[SPACE]
  STUNNED","BY[SPACE]YOUR[SPACE]STUN[SPACE]GRENADES"
5 PRINT"[RIGHT2,DOWN3]HIT[SPACE]-C-[SPACE]TO[SPACE]
  CONTINUE"
6 GET A$:IF A$=""THEN 6
7 IF A$="C"THEN 9
8 GOTO 6
9 PRINT"[CLEAR,BLACK]GRENADES[SPACE]ARE[SPACE]LAUNCHED",
  "BY[SPACE]HOLDING[SPACE]JOYSTICK","IN[SPACE]THE[SPACE]
  DESIRED"
10 PRINT"DIRECTION[SPACE]AND[SPACE]PUSHING","THE[SPACE]
   FIRE[SPACE]BUTTON"
11 PRINT"[DOWN,GREEN]START[SPACE]WITH[SPACE]3[SPACE]
   SOLDIERS","EXTRA[SPACE]SOLDIER[SPACE]ADDED","EACH
   [SPACE]TIME[SPACE]YOU[SPACE]RESCUE"
12 PRINT"A[SPACE]COMPLETE[SPACE]SET","OF[SPACE]40[SPACE]
   HOSTAGES"
13 PRINT"[DOWN,RED]EXTRA[SPACE]SPIDER[SPACE]ALSO","ADDED
   [SPACE]WITH[SPACE]COMPLETION"
14 PRINT"[DOWN3,BLACK,RIGHT3]HIT[SPACE]-C-[SPACE]TO[SPACE]
   LOAD","[RIGHT4]MAIN[SPACE]PROGRAM"
15 GET A$:IF A$=""THEN 15
16 IF A$="C"THEN 18
17 GOTO 15
18 FOR I=7424 TO 7503:READ R:POKE I,R:NEXT
```

```
19 DATA 0,0,0,0,0,0,0,0,16,56,80,120,84,18,16,48
20 DATA 124,84,124,56,68,40,16,40,153,90,189,126,126,189,
   66,129
21 DATA 0,48,126,127,127,62,30,56,24,60,24,60,90,24,36,102
22 DATA 255,255,255,255,255,255,255,255,0,24,60,54,45,52,
   44,60
23 DATA 0,24,60,54,45,52,44,60,0,0,0,255,255,0,0,0
24 PRINT"[CLEAR]":POKE 198,5:POKE 631,78:POKE 632,69
   :POKE 633,87:POKE 634,13:POKE 635,131:END
```

Spider Rescue

```
0 POKE 52,29:POKE 56,29:CLR:S=-22:E=30720:S3=36876:V=36878
  :POKE V,15:Z=7680:NA=2
1 DIM JS(2,2):POKE 37139,0:LL=37154:PA=37137:PB=37152
2 FOR I=0 TO 2:FOR J=0 TO 2:READ JS(J,I):NEXT J,I
3 DATA-23,-22,-21,-1,0,1,21,22,23
4 DEF FN X(R)=INT(RND(1)*451)+7702
5 F(0)=-21:F(1)=-22:F(2)=-23:F(3)=-1:F(4)=1:F(5)=21
  :F(6)=22:F(7)=23
6 PRINT"[CLEAR]":POKE 36869,255:D=0:POKE 36881,125
7 POKE 36879,31:FOR I=1 TO 22:PRINT"[UP,WHITE])";:NEXT
8 FOR I=8164 TO 8185:POKE I,41:NEXT
9 FOR I=1 TO 500:NEXT:FOR I=1 TO 40
10 R=FN X(R):IF PEEK(R)<>32 THEN 10
11 POKE R,37:POKE R+E,INT(RND(1)*3)+2:NEXT I
12 FOR X=125 TO 24 STEP-1:FOR T=1 TO 10:NEXT T
   :POKE 36881,X:NEXT X
13 FOR J=1 TO 500:NEXT J
14 FOR I=0 TO NA
15 T(I)=FN X(R):IF PEEK(T(I))<>32 THEN 15
16 POKE T(I),35:POKE T(I)+E,.:POKE S3,200
17 FOR J=1 TO 200:NEXT J:POKE S3,0:NEXT I
18 O=FN X(R):IF PEEK(O)<>32 THEN 18
19 POKE O,33:POKE O+E,5:FOR J=1 TO 400:NEXT
20 FOR K=250 TO 128 STEP-2:POKE S3,K:NEXT K:POKE S3,0
21 IF D=40 THEN 74
22 Q=.:POKE LL,127:IF-((PEEK(PB)AND 128)=.)THEN Q=1
23 POKE LL,255:P=PEEK(PA)
24 IF-((P AND 8)=.)THEN Q=22
25 IF((P AND 16)=.)THEN Q=-1
26 IF((P AND 4)=.)THEN Q=-22
```

```
27 IF-((P AND 32)=.)THEN 48
28 IF Q=0 THEN 34
29 S=Q
30 IF PEEK(O+Q)=41 OR PEEK(O+Q)=36 THEN 34
31 IF PEEK(O+Q)=37 THEN D=D+1:POKE S3,230:SC=SC+10
   :POKE S3,0
32 POKE O,32:O=O+Q:POKE O,33:POKE O+E,5
33 G=O-Z:Y=INT(G/22):C=G-Y*22
34 FOR I=0 TO NA
35 G=T(I)-Z:H=INT(G/22):P=G-H*22
36 IF SF(I)>0 THEN SF(I)=SF(I)-1:POKE T(I),36
   :POKE T(I)+E,2:GOTO 47
37 IF RND(1)>.7 THEN 43
38 R=0:IF H<Y THEN R=22
39 IF H>Y THEN R=-22
40 IF P<C THEN R=R+1
41 IF P>C THEN R=R-1
42 F=R:GOTO 44
43 R=INT(RND(1)*8):F=F(R)
44 IF PEEK(T(I)+F)=33 THEN 60
45 IF PEEK(T(I)+F)<>32 THEN 47
46 POKE S3,128:POKE T(I),32:T(I)=T(I)+F:POKE T(I),35
   :POKE T(I)+E,.:POKE S3,0
47 NEXT:GOTO 21
48 IF W>0 THEN 28
49 W=O+S:U=39:GOTO 51
50 POKE S3,220:POKE W,32:W=W+S:BU=BU+1:POKE S3,0
51 IF PEEK(W)=37 THEN POKE W,37:W=0:BU=0:GOTO 28
52 IF PEEK(W)=41 OR PEEK(W)=36 OR BU>10 THEN W=0:BU=0
   :GOTO 28
53 IF PEEK(W)=35 THEN 56
54 POKE W,U:POKE W+E,0
55 GOTO 50
56 FOR I=1 TO 10
57 POKE S3,128:POKE W,36:POKE S3,200:NEXT:POKE S3,0
58 FOR I=0 TO NA:IF W=T(I)THEN SF(I)=20:I=NA
59 NEXT:W=0:GOTO 28
60 POKE T(I),32
61 FOR I=1 TO 100
62 POKE O,33:POKE S3,128:POKE O,34:POKE S3,200:NEXT
   :POKE S3,0
63 NM=NM+1
64 IF NM=3 THEN FOR X=1 TO 2000:NEXT X:FOR X=24 TO 125
   :POKE 36881,X:NEXT:GOTO 66
```

```
65 GOTO 18
66 PRINT"[CLEAR]";:POKE 36869,240
67 PRINT"[DOWN5,RVS,BLACK]YOUR[SPACE]SCORE:"SC
68 IF SC>HSC THEN HSC=SC
69 PRINT"[DOWN2,RED]HIGH[SPACE]SCORE:"HSC
70 PRINT"[DOWN3,MAGENTA]PLAY[SPACE]AGAIN?[SPACE]PRESS
   [SPACE,RVS]Y[RVOFF,SPACE]":FOR X=125 TO 24 STEP-1
   :POKE 36881,X:NEXT
71 GET R$:IF R$=""THEN 71
72 IF R$="Y"THEN SC=0:D=0:NM=0:FOR X=24 TO 125
   :POKE 36881,X:NEXT:GOTO 6
73 END
74 FOR I=1 TO 1000:NEXT:D=0:NM=NM-1:NA=NA+1
75 IF NM<3 THEN 6
76 GOTO 67
```

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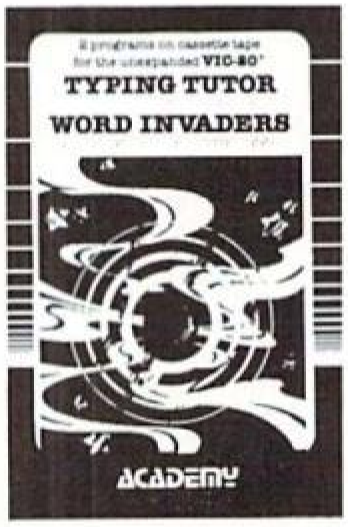

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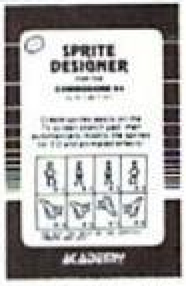

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high scores

Up until recently we had been accepting scores on the honor system. But we thought it was time to start getting more official. So, from now on, in order to have your high score published, you'll have to send in a photo of the screen showing the score. Don't forget—a simple polaroid will do it.

BLUE MEANIES	1,260 Alan S. Newman, Fairfield, CT
CAR CHASE	90,440 Alan Howard, Silver Lake, KS
CLOWNS	12,360 Mark Fellows, Littleton, MA
COSMIC CRUNCHER	503,610 Hermine Koch, Anoka, MN
DRAW POKER	17,410 R. Callia, Torrance, CA
JUPITER LANDER	207,400 Christopher Champlain, St. Petersburg, FL
GORF	301,470 Tricia Muller, Lafayette, IN
MIDNIGHT DRIVE	14.11 km Nathan Mehl, Newark, DE
MOLE ATTACK	368 Brian Gleason, Concord, CA
MONEY WARS	65,110 John B. Crockford, Jr., Spencerville, OH
OMEGA RACE	476,500 (5 ships) Gary Kemper (photos in hand, address unknown)
PINBALL	1,500,000 Joe Ferrari, Commodore, Toronto
RADAR RAT RACE	133,920 Danny Wessels, Sykesville, MD
RAID ON FORT KNOX	
SEA WOLF	29,500 Alieia Kondalski, Toledo, OH
SKY IS FALLING	13,810 Rachel Koons, Drexel Hill, PA
SLITHER	261 Amy Miles, Mt. Pleasant, MI
SUPER ALIEN	45,700 Robert Schaeffer, Brookline, MA
SUPER SLITHER	167 David Goldberg, Richardson, TX
SUPER SLOT	7,306 coins Jerry Krueger, Cary, IL
SUPER SMASH	
VIC AVENGER	14,279 Eric Tang, Sterling Heights, MI

If your score didn't set a record this time, keep playing! Maybe you'll topple these champion gamesters next time! **C**

access:
commodore user groups

User Group Listing

ALABAMA

Huntsville PET Users Club
9002 Berclair Road
Huntsville, AL 35802
Contact: Hal Carey
Meetings: every 2nd
Thursday

ALASKA

COMPOOH-T
c/o Box 118
Old Harbor, AK 99643
(907) 286-2213

ARIZONA

VIC Users Group
2612 E. Covina
Mesa, AZ 85203
Contact: Paul Muffuletto

Catalina Commodore Computer Club
2012 Avenida Guillermo
Tucson, AZ 85710
(602) 296-6766
George Pope
1st Tues. 7:30 p.m.
Metro Computer Store

Central Arizona PET People
842 W. Calle del Norte
Chandler, AZ 85224
(602) 899-3622
Roy Schahrer

ACUG
c/o Home Computer Service
2028 W. Camelback Rd.
Phoenix, AZ 85015
(602) 249-1186
Dan Deacon
First Wed. of month

West Mesa VIC
2351 S. Standage
Mesa, AZ 85202
Kenneth S. Epstein

Arizona VIC 20-64 Users Club
232 W. 9th Place North
Mesa, AZ 85201
Donald Kipp

ARKANSAS

Commodore/PET Users Club
Conway Middle School
Davis Street
Conway, AR 72032
Contact: Geneva Bowlin

Booneville 64 Club
c/o A. R. Hederich
Elementary School
401 W. 5th St.
Booneville, AR 72927
Mary Taff

CALIFORNIA

SCPUG Southern California
PET Users Group
c/o Data Equipment Supply
Corp.
8315 Firestone Blvd.
Downey, CA 90241
(213) 923-9361
Meetings: First Tuesday of
each month

California VIC Users Group
c/o Data Equipment Supply
Corp.
8315 Firestone Blvd.
Downey, CA 90241
(213) 923-9361
Meetings: Second Tues. of
each month

Valley Computer Club
2006 Magnolia Blvd.
Burbank, CA
(213) 849-4094
1st Wed. 6 p.m.

Valley Computer Club
1913 Booth Road
Ceres, CA 95307

PUG of Silicon Valley
22355 Rancho Ventura Road
Cupertino, CA 95014

Lincoln Computer Club
750 E. Yosemite
Manteca, CA 95336
John Fung, Advisor

PET on the Air
525 Crestlake Drive
San Francisco, CA 94132
Max J. Babin, Secretary

PALS (Pets Around)
Livermore Society
886 South K
Livermore, CA 94550
(415) 449-1084
Every third Wednesday
7:30 p.m.
Contact: J. Johnson

SPHINX
7615 Leviston Ave.
El Cerrito, CA 94530
(415) 527-9286
Bill MacCracken

San Diego PUG
c/o D. Costarakis
3562 Union Street
(714) 235-7626
7 a.m.-4 p.m.

Walnut Creek PET
Users Club
1815 Ygnacio Valley
Road
Walnut Creek, CA 94596

Jurupa Wizards
8700 Galena St.
Riverside, CA 92509
781-1731
Walter J. Scott

The Commodore Connection
2301 Mission St.
Santa Cruz, CA 95060
(408) 425-8054
Bud Massey

San Fernando Valley
Commodore Users Group
21208 Nashville
Chatsworth, CA 91311
(213) 709-4736
Tom Lynch
2nd Wed. 7:30

VACUUM
277 E. 10th Ave.
Chico, CA 95926
(916) 891-8085
Mike Casella
2nd Monday of month

VIC 20 Users Group
2791 McBride Ln. #121
Santa Rosa, CA
(707) 575-9836
Tyson Verse

South Bay Commodore Users Group
1402 W. 218th St.
Torrance, CA 90501
Contact: Earl Evans

Slo VIC 20/64 Computer Club
1766 9th St.
Los Osos, CA

The Diamond Bar R.O.P. Users Club
2644 Amelgado
Haciendo Hgts., CA 91745
(213) 333-2645
Don McIntosh

Commodore Interest Association
c/o Computer Data
14660 La Paz Dr.
Victorville, CA 92392
Mark Finley

Fairfield VIC 20 Club
1336 McKinley St.
Fairfield, CA 94533
(707) 427-0143
Al Brewer
1st & 3rd Tues. at 7 p.m.

Computer Barn Computer Club
319 Main St.
Suite #2
Salinas, CA 93901
757-0788
S. Mark Vanderbilt

Humboldt Commodore Group
P.O. Box 570
Arcata, CA 95521
R. Turner

Napa Valley Commodore
Computer Club
c/o Liberty Computerware
2680 Jefferson St.
Napa, CA 94558
(707) 252-6281
Mick Winter
1st & 3rd Mon. of month

S.D. East County C-64 User Group
6353 Lake Apopka Place
San Diego, CA 92119
(619) 698-7814
Linda Schwartz

Commodore Users Group
4237 Pulmeria Ct.
Santa Maria, CA 93455
(805) 937-4174
Gilbert Vela

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Walnut Creek Group
1406 N. Broadway at Cypress
Walnut Creek, CA 94596
Wil Cossel
Sat. 11 a.m. to 3 p.m.

Amateurs and Artesians Computing
P.O. Box 682
Cobb, CA 95426

Manteca VIC 20 Users Organization
429 N. Main St.
Manteca, CA 95336
Gene Rong

Pomona Valley Vic Users Group
1401 W. 9th, #77
Pomona, CA 91766
(714) 620-8889
Mark Joerger
1st & 3rd Wed. of month 7 p.m.

20/64 Users Group
P.O. Box 18473
San Jose, CA 95158
Don Cracraft
1st Sunday, 6 p.m., Mercury Sav

COLORADO

VICKIMPET Users Group
4 Waring Lane, Greenwood
Village
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Contact: Louis Roehrs

Colorado Commodore Computer Club
2187 S. Golden Ct.
Denver, CO 80227
986-0577
Jack Moss
Meet: 2nd Wed.

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Skiff Lane Masons Island
Mystic, CT 06355
(203) 536-9789

Commodore User Club
Wethersfield High School
411 Wolcott Hill Road
Wethersfield, CT 06109
Contact: Daniel G. Spaneas

VIC Users Club
c/o Edward Barszczewski
22 Tunxis Road
West Hartford, CT 06107

New London County
Commodore Club
Doolittle Road
Preston, CT 06360
Contact: Dr. Walter Doolittle

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401 Monument Road, #177
Jacksonville, FL 32211

Richard Prestien
6278 SW 14th Street
Miami, FL 33144

South Florida
PET Users Group
Dave Young
7170 S.W. 11th
West Hollywood, FL 33023
(305) 987-6982

VIC Users Club
c/o Ray Thigpen
4071 Edgewater Drive
Orlando, FL 32804

PETs and Friends
129 NE 44 St.
Miami, FL 33137
Richard Plumer

Sun Coast VICs
P.O. Box 1042
Indian Rocks Beach, FL
33535
Mark Weddell

Bay Commodore Users
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c/o Gulf Coast Computer
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241 N. Tyndall Pkwy.
P.O. Box 6215
Panama City, FL 32401
(904) 785-6441
Richard Scofield

Gainesville Commodore
Users Club
3604-20A SW 31st Dr.
Gainesville, FL 32608
Louis Wallace

64 Users Group
P.O. Box 561689
Miami, FL 33156
(305) 274-3501
Eydie Sloane

Brandon Users Group
108 Anglewood Dr.
Brandon, FL 33511
(813) 685-5138
Paul Daugherty

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P.O. Box 5837, MP 142
Orlando, FL 32855
(305) 352-3252/2266
Mr. Earl Preston

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414 E. Lumsden Rd.
Brandon, FL 33511

Gainesville Commodore Users Group
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Gainesville, FL 32602
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El Shift OH
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Cocoa, FL 32922
Mike Schnoke
Sat. mornings/every 4 to 6 weeks

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VIC Educators Users Group
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Canton, GA 30114
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Glynco, GA 31524
Richard L. Young

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Eric Ellison

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Commodore Users Group of Honolulu
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824 Bannister St.
Honolulu, HI
(808) 848-2088
3rd Fri. every month

20/64 Hawaii
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(217) 562-4568

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Mt. Zion, IL 62549
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Contact: Jim Oldfield

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Contact: Brant Anderson

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President

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Contact: Ted Powell

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Brian Lepley or Tom Vlasic

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(219) 726-4202
Stephen Erwin

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John Patrick, President

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Marion, IA 52302
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Vern Rotert
3rd Sun. of month

Siouxland Commodore Club
2700 Sheridan St.
Sioux City, IA 51104
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Gary Johnson
1st & 3rd Monday of month

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Kenneth McGruder, Sr.

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Wayne D. Lowery, R.N.

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Assoc. of Personal
Computer Users
5014 Rodman Road
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Interactive LOGO

by David Malmberg

Let's continue the exploration of LOGO for the Commodore 64 that we began in the last issue of Power/Play. *In this installment we'll explore LOGO's capabilities to interact with people and how this interaction may be used as an aid to learning. Specifically, we'll develop two interactive LOGO programs that facilitate the learning of some valuable concepts and allow the student to have fun at the same time. The first program will be a real-time drawing program called INSTANTDRAW, which is the LOGO equivalent of the popular toy Etch-A-Sketch. The second program will be a variation of Commodore's computer game* Jupiter Lander, *which I have renamed* LOGO Lander *for obvious reasons.*

INSTANTDRAW

In this program we want to provide an easy way to let a child (of any age) draw using LOGO's great graphics. We want the program to be highly interactive by having each drawing command require just a single keystroke. We also want the drawings to be in real-time so that the artist can draw instantly without having to resort to writing a program. INSTANTDRAW can therefore be used by kids as young as three or four to become familiar with the 64's keyboard, to help develop hand-eye coordination, to develop artistic capabilities and eventually to enhance problem-solving skills.

The INSTANTDRAW program lets you control the movement of LOGO's turtle and with it draw instantly on the 64's screen. You control the drawing with these keys:

R—rotates the turtle's heading to the right
L—rotates the heading to the left
U—lifts the turtle's pen up to stop drawing
D—puts the pen down to draw on the screen
C—clears the screen and lets you start over
0,1,2,...,9 set the length of the turtle's pen strokes

In a program like this it is important to keep input and output simple to make the Commodore 64 as interactive as possible. This is especially true when you are writing something to be used by children whose keyboard and reading skills are just developing. Typically this is done by making maximum use of graphics and pictures for output and by keeping keyboard input to a minimum number of strokes. To simplify input in BASIC, reading the keyboard is best handled by a GET command that does not require a RETURN key after each entry. To perform this same simplified input in LOGO you must write your own procedure like this:

```
TO GET.KEY
   IF RC? OUTPUT READCHARACTER
   OUTPUT "
END
```

When you want to get the image of a key that may have been pressed, you use a GET.KEY command in your LOGO program. This procedure will output the character image for the key, if one has been pressed, and a "null" character otherwise. This procedure works because RC?, a predefined LOGO routine (called a LOGO *primative*), outputs a value of true or false, indicating the presence or absence of a character in the keyboard input buffer. If true, the OUTPUT READCHARACTER part of the second line causes that character image to be output by the procedure and the procedure terminates since an output has been generated. If false, there is no character in the input buffer and the third line outputs a null character.

Now let's see how to use this procedure to read the keys needed to generate the interactive drawing commands described above.

```
TO COMMAND
   MAKE "KEY GET.KEY
   CLEARINPUT
   IF :KEY = " STOP
   IF :KEY = "R RIGHT 30 STOP
   IF :KEY = "L LEFT 30 STOP
   IF :KEY = "U PENUP STOP
   IF :KEY = "D PENDOWN STOP
   IF :KEY = "C SET.UP STOP
   TEST NUMBER? :KEY
   IFFALSE STOP
   MAKE "STEP :KEY
END
```

The TO COMMAND gives the title for this new procedure so that whenever we want to check for commands from the keyboard we can just have the word COMMAND in our program. The second line of this procedure causes the variable KEY to have the value of whatever key has been pressed (if any) as outputted by our procedure GET.KEY. CLEARINPUT clears the keyboard input buffer so keyboard commands do not get "stacked up" before they can be processed by the program. This is essentially a house-keeping LOGO command.

The fourth command says "If the current value of KEY (the colon preceding KEY indicates the variable's current value) is a null character then STOP this procedure." In this context, a STOP is like a RETURN command in BASIC. It causes the subroutine or procedure to be instantly terminated and control of the program to return to wherever it was before it began to execute the procedure.

The fifth line tests for an "R" key being pressed and causes the drawing turtle to rotate its heading 30 degrees to the right. The next command causes a similar shift to the left if an "L" key is pressed. Similarly, if a "U" or "D" is pressed the next two commands raise or lower the turtle's pen. If "C" is pressed the SET.UP procedure (to be described shortly) clears the screen and allows the INSTANTDRAW artist to begin with a clean canvas.

The TEST NUMBER? :KEY in the fourth from the last line tests whether the key pressed is a digit from zero to nine. If it is, a "truth flag" is set to true. The next command then tests this flag and STOPs if it is false, i.e., the key is not a digit. Otherwise the next command makes the digit pressed the new value for the variable STEP.

To translate these keyboard commands into motion, we can use the following simple procedure:

```
TO MOVE
   FORWARD :STEP
   COMMAND
   MOVE
END
```

This procedure has only three instructions in its body. The first causes the turtle to move forward along its current heading a distance equal to the current value of STEP. In the COMMAND procedure you will recall that STEP will have a value ranging from zero (i.e., no movement at all) to nine (fairly long "brush strokes.") If the pen is down, the turtle will draw as it moves. The next instruction causes the COMMAND procedure, as described above, to be executed. The last instruction is a *recursive* call to MOVE itself that begins the whole movement loop again.

To add the finishing touches to INSTANTDRAW we just need two more short procedures. The first is SET.UP which initializes the variable STEP at the beginning of the program to zero—so the turtle begins by staying in his HOME position awaiting your first keystroke command. SET.UP also contains DRAW, a LOGO primative, which clears the screen and HOMEs the turtle, and FULLSCREEN, another primative, which assures that the turtle can draw everywhere. Specifically, we have:

```
TO SET.UP
   MAKE "STEP 0
   DRAW
   FULLSCREEN
END
```

The last procedure is called INSTANTDRAW and it is the one executed to start the entire program:

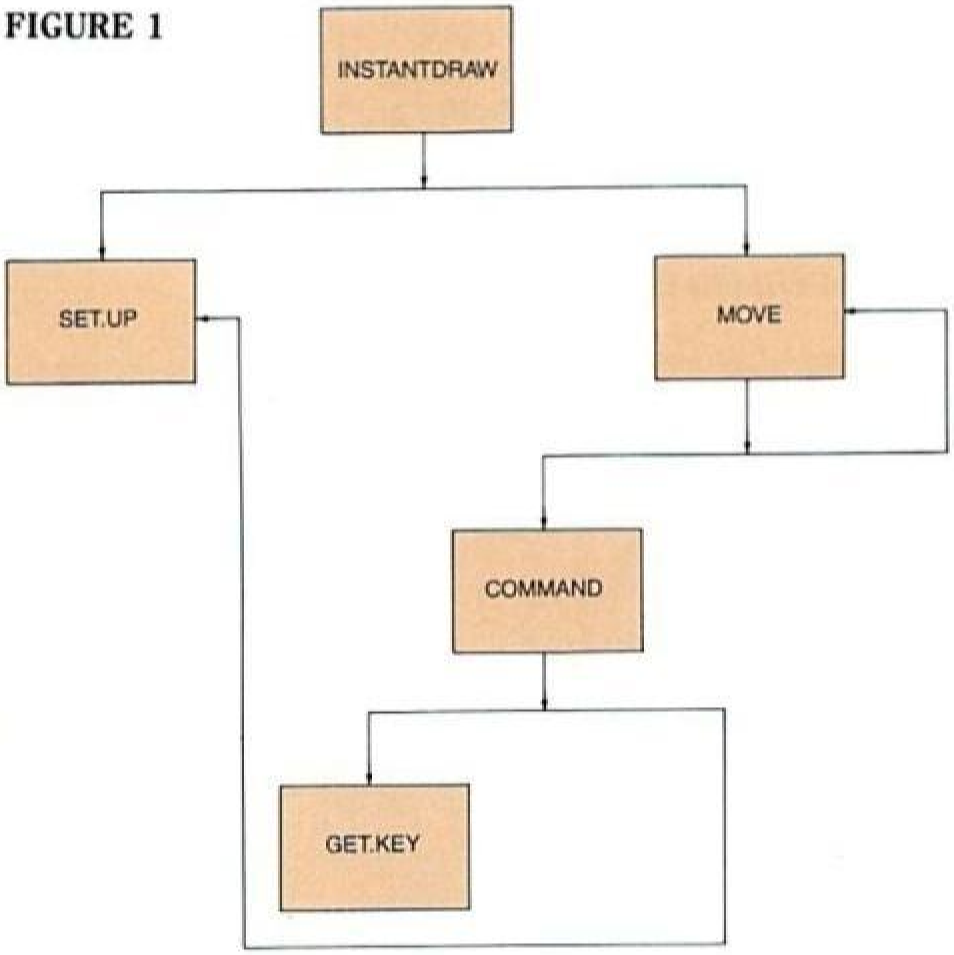
```
TO INSTANTDRAW
   SET.UP
   MOVE
END
```

Notice that when INSTANTDRAW is executed it calls SET.UP and MOVE. MOVE is executed over and over again by recursive calls to itself, and SET.UP is not executed again unless a "C" is hit in the COMMAND procedure to clear the screen and begin a new drawing.

The clearest way to see how these procedures fit together and to see what procedures call or reference what other procedures is by constructing a *procedure diagram* or, as it is sometimes called, a *procedure tree*. Figure 1 is a procedure diagram for INSTANTDRAW. In the diagram, each procedure shows the procedures that it references just below it, starting with the one called first on the left-most side. Notice the "circular" reference to MOVE to indicate recursion.

Typically, when developing a LOGO program, you will find it helpful to sketch out an overall procedure diagram to identify the specific tasks or procedures to be programmed and to clearly understand the sequence and the relationship between these individual procedures. This process is sometimes called *top-down* design. After you have produced this top-down overview you will tend to program the individual tasks from the *bottom-up*—with separate testing of each procedure as you go along to assure that each does what it is supposed to do.

FIGURE 1



LOGO Lander

The procedure diagram for LOGO Lander is given in Figure 2 and the listing is at the end of the article. The program uses a few more LOGO tricks and some new commands (see the Commodore 64 LOGO reference manual) but the overall ideas and structure for interactivity are quite similar to INSTANTDRAW and are fairly straightforward.

At first blush, LOGO Lander appears to be a straightforward game. You try to land your command module (represented by the turtle's triangle shape) on the planet LOGO without crashing. But this game is really a vehicle for teaching a great deal more than just hand-eye coordination. LOGO Lander teaches many principles of Newtonian physics in a painless and even fun manner. By playing the game, the student learns about resultant forces, the laws of motion, gravity and even about some of the perils of space travel.

The game is simple to play but can be very difficult to master. Your mission is to land your command module as close to the landing site at the bottom of the screen as possible. You get points for your touchdown's distance from the target, the speed of your flight, and the softness of your landing. There are three possible skill levels, which influence the amount of gravitational pull you have to contend with and the degree of finesse required to avoid a crash landing. My personal best score is 1761 points for a soft landing 5 miles from the target obtained during a 35 second flight. To be honest, I also have many scores of minus 1000 points or less for more distant crash landings.

Just as in Commodore's *Jupiter Lander,* your command module has a main rocket that moves you forward on your current heading, and two side rockets that cause you to move sideways. These rockets are controlled by the following keys:

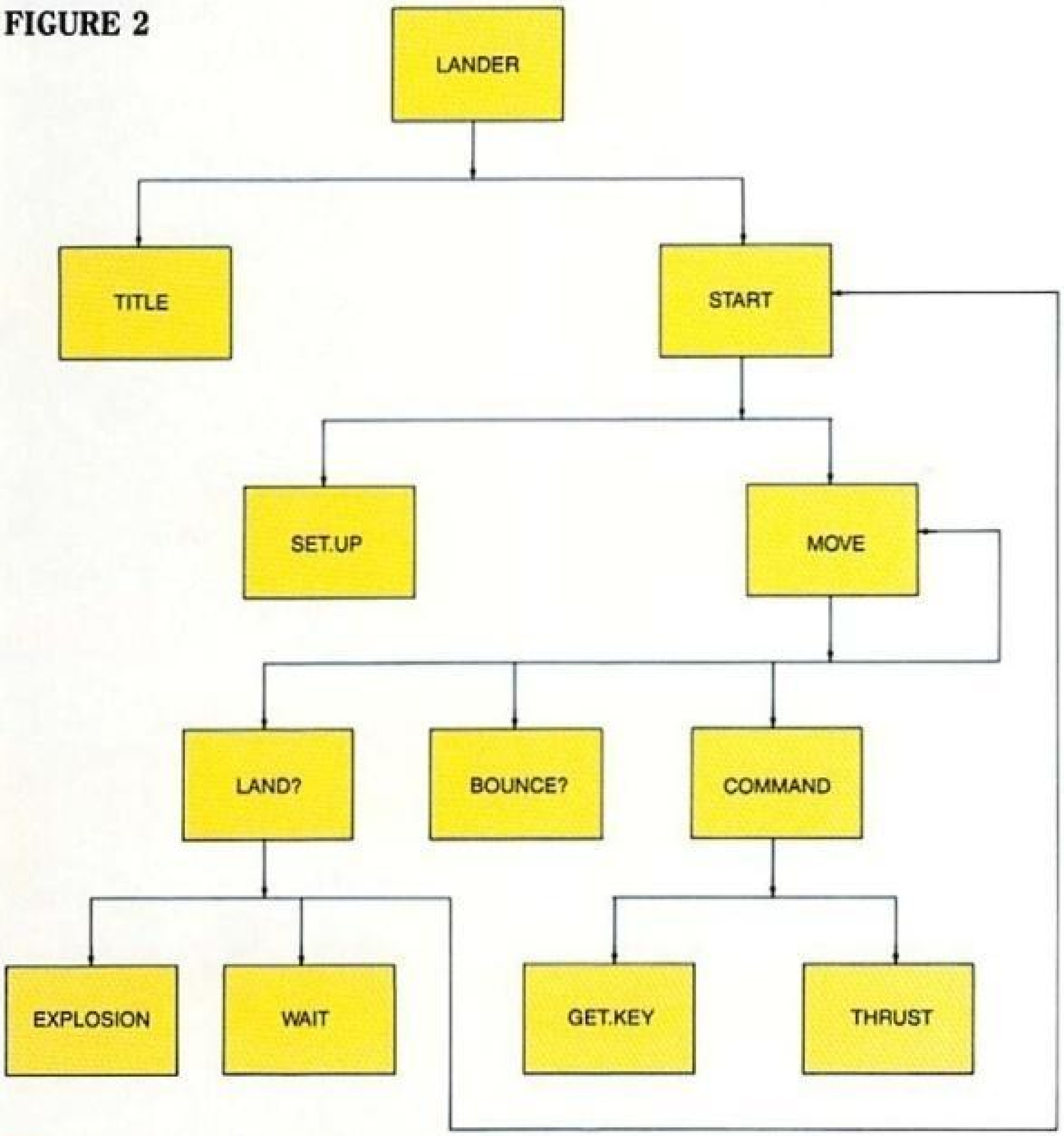
A—blasts module toward left
S—blasts module forward
D—blasts module toward right
0 to 9—changes rocket blast force

You may also hit "R" and "L" to shift the direction your command module is heading. This will obviously change the directional effect of any subsequent rocket blasts.

When piloting your module in deep space (i.e.,

Continued on page 60

FIGURE 2



The room is a large cavern full of broken stone. The walls are scorched and there are deep scratches on the floor. A sooty dry smell is very strong here. A paved path winds from a small passage to the west, through the room, and across a cyclopean stone bridge to the south. To the east a small crack is visible. A dark and smokey tunnel leads north.

A huge red dragon is lying here, blocking the entrance to a tunnel leading north. Smoke curls from his nostrils and out between his teeth.

Your sword has begun to glow very brightly.

Listen to Dragon

The huge red dragon makes no sound.

The dragon looks bored.

Talk to Dragon

The dragon looks amused. He speaks in a voice so deep you feel rather than hear it, but the tongue is unknown to you. You feel almost hypnotized.

The dragon continues to watch you carefully.

— Zork —

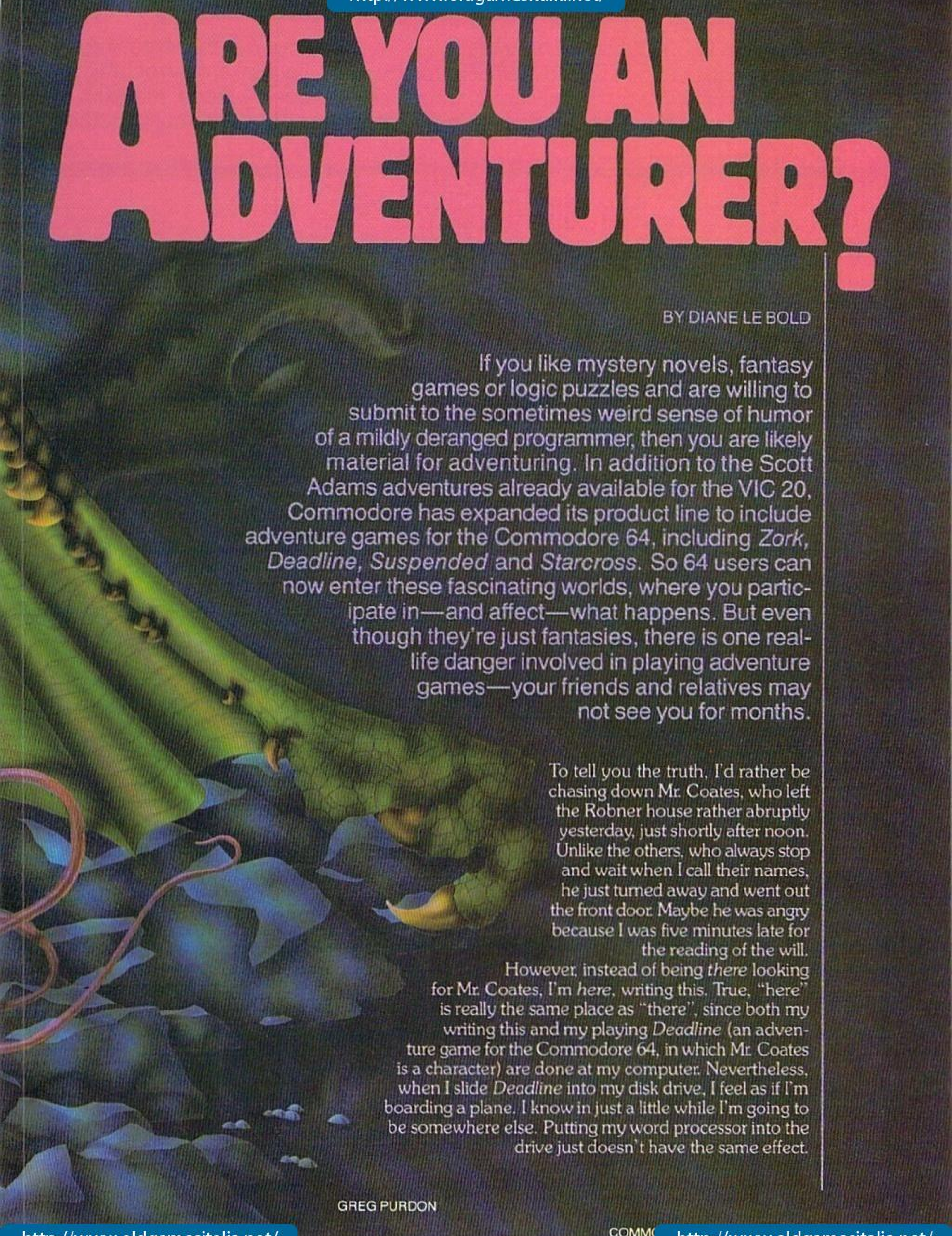
ARE YOU AN ADVENTURER?

BY DIANE LE BOLD

If you like mystery novels, fantasy games or logic puzzles and are willing to submit to the sometimes weird sense of humor of a mildly deranged programmer, then you are likely material for adventuring. In addition to the Scott Adams adventures already available for the VIC 20, Commodore has expanded its product line to include adventure games for the Commodore 64, including *Zork*, *Deadline*, *Suspended* and *Starcross*. So 64 users can now enter these fascinating worlds, where you participate in—and affect—what happens. But even though they're just fantasies, there is one real-life danger involved in playing adventure games—your friends and relatives may not see you for months.

To tell you the truth, I'd rather be chasing down Mr. Coates, who left the Robner house rather abruptly yesterday, just shortly after noon. Unlike the others, who always stop and wait when I call their names, he just turned away and went out the front door. Maybe he was angry because I was five minutes late for the reading of the will.

However, instead of being *there* looking for Mr. Coates, I'm *here*, writing this. True, "here" is really the same place as "there", since both my writing this and my playing *Deadline* (an adventure game for the Commodore 64, in which Mr. Coates is a character) are done at my computer. Nevertheless, when I slide *Deadline* into my disk drive, I feel as if I'm boarding a plane. I know in just a little while I'm going to be somewhere else. Putting my word processor into the drive just doesn't have the same effect.



GREG PURDON

Eventually you figure out how to use the robots in *Suspended* with increasing efficiency. But, the point is, you learn it piece by piece, by trial and error, until you have the full picture. That's the way adventures work—piece by piece, trial and error, and then suddenly it all comes together. Or at least part of it comes together.

Adventure worlds appeal to me more than the standard pursuit/shoot-em-up games, probably for the same reason that *Alice in Wonderland* and *Through the Looking Glass* appeal to me. In fact, adventures have a lot in common with these classic stories. It's just that instead of entering the adventure worlds through a rabbit hole or mirror, you enter through your computer. And, instead of being just a passive observer of events, you get to participate in them. Let us not forget, by the way, that Lewis Carroll (aka Charles Dodgson), the author of the Alice books, was a mathematician who enjoyed things like chess, logic puzzles and anagrams. I'd almost bet that, had Carroll lived in the 1980's, he'd have been a programmer—of adventure games.

I have to admire the minds who create these little worlds, just as I admire Carroll's. No two adventure worlds are the same, and every time I enter a new adventure and start wandering around, stumbling over clues, finding out what works and what doesn't, catching on to the vocabulary, it's almost like exploring a new corner of my own mind.

It usually takes a while to get used to the unique environment (and limitations) of each game, but you're free to explore to your curiosity's content—at least until you make a fatal error and get deep-sixed. But, what the heck. Even if you die, all you have to do is start over again—scarred, maybe, but definitely wiser. (If you take your adventures seriously, by the way, you might want to save

Journal Of An Unknown Explorer

BY JIM GRACELY

This is a review of one of Commodore's adventure games, but at Jim's request we're not telling you which one. As Jim put it, "If they can't figure out what it's about, then they probably won't want to play it anyway." Can you see the obvious(?) clues?

Something woke me from my hibernation. As I became more conscious of my condition, I recognized the mass detector alarm, which must have triggered my arousal.

Translated unidentified mass coordinates for the navigational computer and sat back for a short ride. Interesting quadrant of the outer reaches of known space.

Approaching a huge cylindrical asteroid of some sort. Definitely not good mining material. Navigational computer has confirmed that the object is "not your usual asteroid".

Red Dock: This is a docking port color-coded in red. A round metal sculpture or relief covers part of the airlock door. There are exactly ten circular bumps or columns on the sculpture: four small bumps, two rather large ones, two medium-sized ones, and then a small one again.

Crystal bubble appears unreachable from here. However, the grassland is quite stunning and have observed small weasel-like creatures hunting what appear to be unicorns.

Remarkable device of some kind keeps bands of force acting as bars to the cages in the zoo. A number of dead creatures are here along with a live colony of rat-ant creatures.

Outside of a small village. Creatures of unknown origin are travelling throughout the entire area. Apparently the entire "city" has been made from scavenged materials. An alien that seems to have a position of power is approaching me.

Spider creature has given me some valuable information to aid my search for the meaning of what I have seen. Air is continuing to thin. I have not found any cause of this problem; however, I have discovered that when I put the... air has suddenly become unbreathable... this is my last entry... good... l... u... c... k...

Some say there is no way to save the strange ship and redeem the doomed inhabitants living on it. Yet rumors have been heard concerning a silver rod, two mysterious disks and a yellow dock. Perhaps someday...

The more complex the adventure, the longer this process takes. Which brings us to an important point. Be sure to take breaks when you're playing an adventure. Also, be sure to breathe while you're playing. These two techniques will keep oxygen flowing to your brain, which helps your game immensely.

your game before you traipse off into dangerous territory. That will prevent the frustration of having to start all over.)

If you've never played an adventure game, you may be a little mystified by all this. So let me backtrack a bit. First, adventures, unlike most of the games you are probably used to playing, are not (for the most part, anyway) graphic wonders. In fact, all you see on your screen are words, which is why some people have called them "participatory novels". True, Scott Adams and others have developed graphic adventures, which provide pictures as well as words. They're great fun. To be frank, however, I prefer creating the pictures in my head, probably for the same reason that some people prefer listening to radio stories rather than watching television. The pictures I create in my own mind are uniquely personal, mysteriously intimate. Someone else's interpretation is almost always something of a disappointment to me.

As you respond to the words on your screen you are led, piece by piece, into a small, self-contained three-dimensional world. For instance, in *Suspended,* you've just been thawed out (after a cryogenic sleep of a few hundred years) because your planet is hitting the skids and you're the only one who can save it. So, before you even have a chance to grab a cup of coffee (which, believe me, after a sleep like that, I'd need), you've got to start ordering six robots around to try to remedy the situation before thousands of people die.

Waking to Chaos

BY DAVE STREET

It is no small wonder that Michael Berlyn, creator of *Suspended,* is rumored to be in an asylum. After only a few cycles of play, it became obvious to me that only the most contorted of souls could have devised such an adventure. The game opens by wrenching you from an uneventful cryogenic slumber and thrusting you into the command position of a world in chaos.

To save this world, you must return the Filter Computers to a state of balance. All right, I will take command! I inventory the resources of my underground complex and find that to help restore balance I have six robots at my command. Great, I will tell them to fix their big brother and let me get back to a more important endeavor (sleeping!). Did I say robots? I stand corrected, I have six mechanical characters, each with their own special capabilities and quirks. First, there is Iris who seems intent on starting some romantic escapade with me. Then there is, what, oh well, was Waldo who just went dysfunctional in the Cavernous Corridor. Do not worry, I have everything under control. Well there is the matter of the 121,000 casualties, but the population was 30,172,000 to start, so maybe no one will notice that a few are missing, and besides 30,051,000 is a much nicer number anyway.

Then there is Whiz who is so intelligent he has to ask a computer what he is carrying. But since his main function seems to be as a walking interface to other computers, his intelligence is not generally an issue. Poet, another robot, performs a number of services, all of which are directed toward tormenting me. He gives such enlightening responses to my inquiries that I still do not know what he is doing and am losing what little idea I had of what I was doing. One more philosophical response and I will send him to the Cavernous Corridor. Like I said, 29,784,000 is a much nicer number than 30,172,000.

Just so you can feel a little pity for me, I am going to outline my present situation. Iris, my seeing robot, is blind. Waldo, my workman, is not working. Whiz is behaving in his normal totally lobotomized manner and has just informed me that he can not query any computers for a while. Auda's auditory circuits are inactive. Sensa is functioning, where I do not know, but she is functioning. And Poet has just dropped this little maxim of enlightenment on me, "Running, running getting nowhere in the hustle and bustle of life". Anyway, I have fewer responsibilities now since there have been an additional 83,000 casualties. Well, now all I have got to do is repair and organize my robots and then save the world. I wonder if Michael Berlyn needs a roommate.

These robots, you gradually discover as you play, are not always a big help. In fact, until you get used to their distinctive capabilities and various little personality quirks, they're often a pain in the neck. But the interesting thing is that they have personality quirks. And you have to deal with—and learn to get around—those quirks, because the robots are your only way to get anything done. And eventually you figure out how to use them with increasing efficiency. But, the point is, you learn it piece by piece, by trial and error, until you have the full picture. That's the way adventures work—piece by piece, trial and error, and then suddenly it all comes together. Or at least part of it comes together.

The more complex the adventure, the longer this process takes, and the more likely you are to want to jump into your monitor and get somebody around the throat. Which brings us to an important point. Be sure to take breaks when you're playing an adventure. Also, be sure to breathe while you're playing. These two techniques will keep oxygen flowing to your brain, which helps your game immensely. I am not kidding, either.

Suspended is different from most adventure games I've played because it comes with a ready-made map of its "world", which happens to be an underground computer complex. In most other adventures you have to map the world yourself as you explore. Which brings us to another important point. A pencil and lots of paper are essential items when you play

Zork I

BY JIM GRACELY

5:30 PM

I opened the package and removed the diskette. My disk drive buzzed as the game loaded into my 64. I was ready for this game. So what if no one I knew had gotten more than 100 out of 350 possible points; I was ready.

As the game continued to load, I reviewed my supplies: Enough blank paper to map out anything ZORK could conjure up, four pencils with good erasers, a red pen for marking important areas and two quarts of black coffee. At last the game is loaded. The introductory material is printed onto the screen and… I'm off…

Hmm… a house. That's easy. In and around and up and down and… Hmm… a cellar. Now we're getting somewhere. South and east and north and north… a fight!! Drat. Dead already. Hmm… forest. North, no east, maybe west, aha! a clearing. Back to the woods, down the canyon, up the cliff, along the path. Hmm… a house. One quart down and one to go.

Start Again

Hey, I'm allowed! One of the nice things about these games is that you can restart whenever you want to. Saves a lot of reloading time.

Back to the grind wheel. Here I go… slash, swing, kill. Now I'm moving. Past the chasm, down the passage, into the cave… Oh my God!

Entrance to Hades
You are outside a large gateway, on which is inscribed
"Abandon every hope, all ye who enter here."
The gate is open; through it you can see a desolation, with a pile of mangled bodies in one corner. Thousands of voices, lamenting some hideous fate, can be heard. The way through the gate is barred by evil spirits, who jeer at your attempts to pass.
WAVE GARLIC
Waving the clove of garlic has no effect.

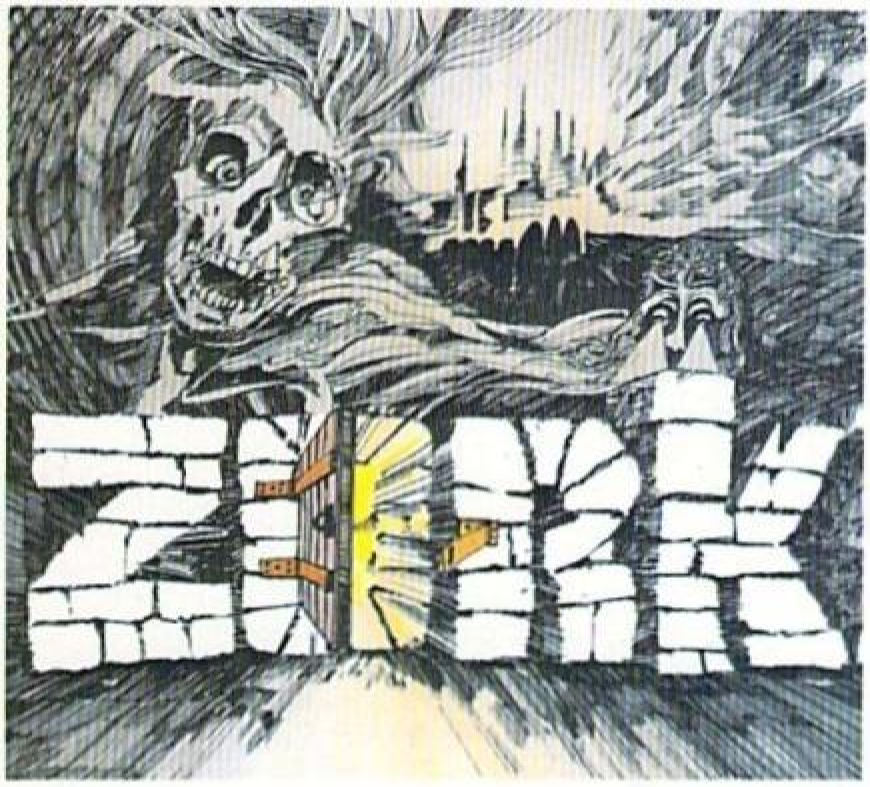
Run away, run away. Gotta keep going. A dam, a lobby, a pile of plastic?? Buttons, not buttons!! I hate buttons!! Jewels at last!. A trident, a loud room, room, room. I must admit I'm doing pretty good. My score… why I've got almost 60 points. Almost, almost. Well 37 is a heck of a lot closer to 60 than to 0!!!!

Where am I now?? A squeaky room? Oh no!!

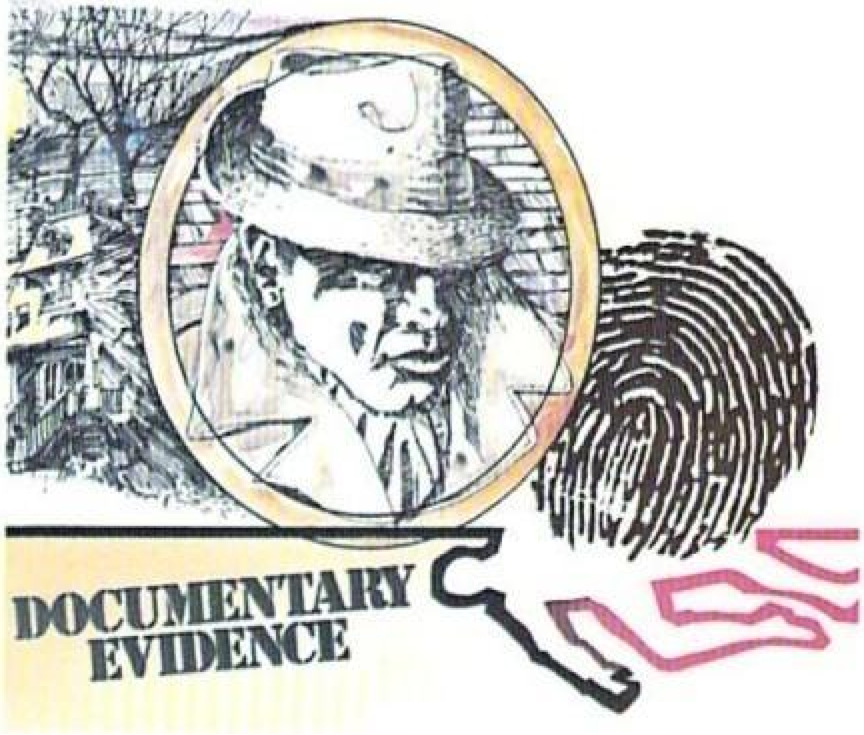
Fweep!
Fweep!
Fweep!
A deranged giant vampire bat (a reject from WUMPUS) swoops down from his belfry and lifts you away…
Coal Mine
This is a non-descript part of a coal mine.

Gas, smelly, timber, ladder, coal, shaft??… everything's spinning… where's my coffee!!!… There goes my lamp!!… Not now!!… I'm out of paper… I'm lost… it's over… I'm dead.

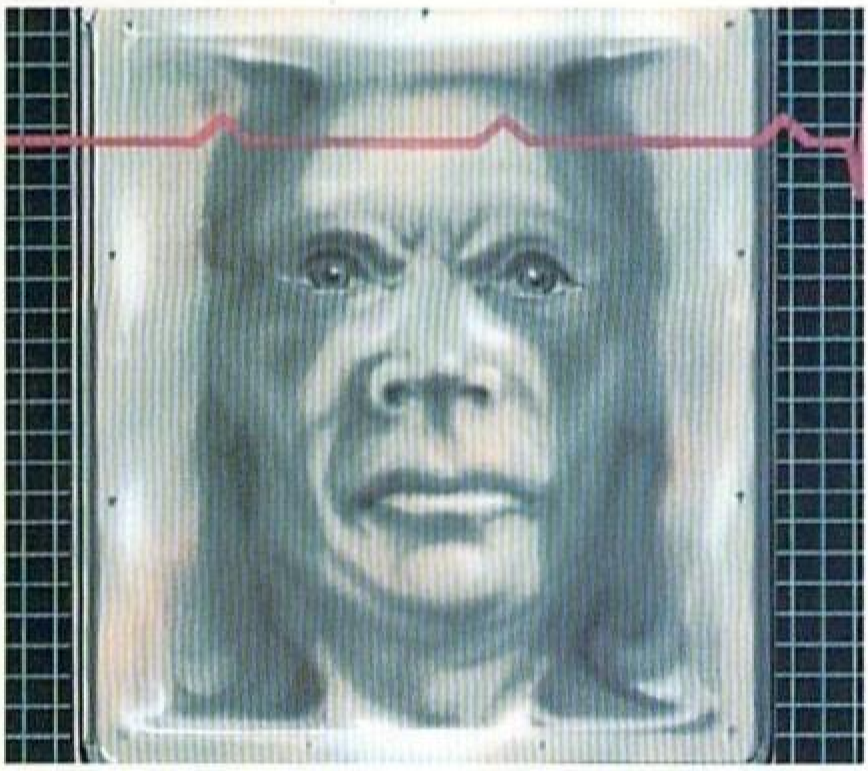
It's 4 o'clock in the morning… won't someone save my life tonight? Guess not. Time for this novice (bah humbug) adventurer to go to sleep.



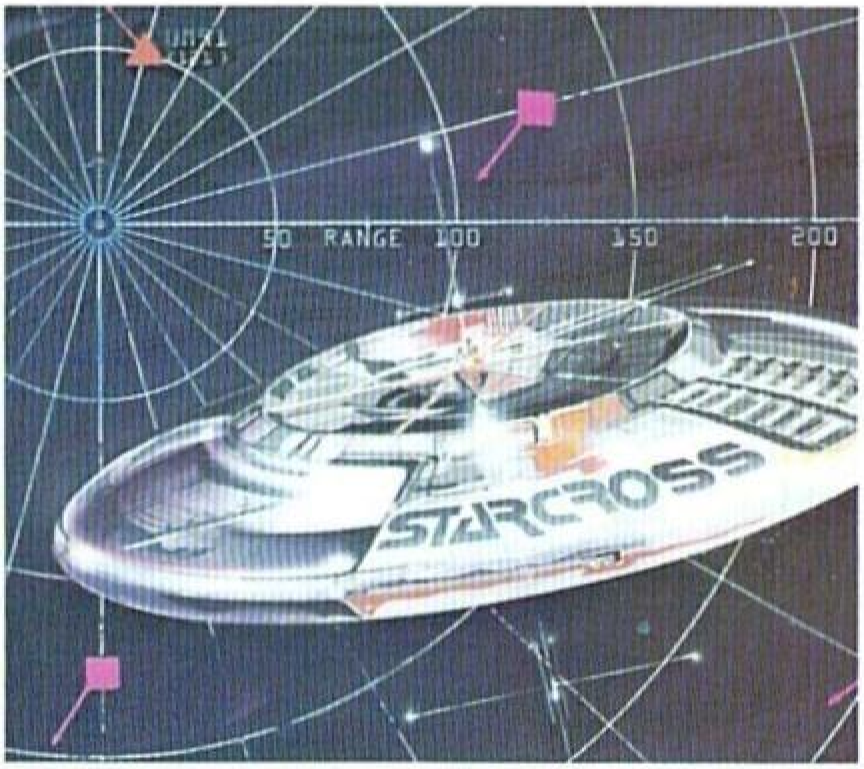
Zork


DOCUMENTARY
EVIDENCE

Deadline



Suspended


50 RANGE 100
150
200
STARCROSS

Starcross

any adventure, first because you absolutely need a map. In addition, you may want to take notes. For instance, in *Deadline,* where you are the police inspector who has only twelve hours to collect evidence and make an arrest, taking notes on each suspect's remarks is crucial. If you don't take notes, you'll probably end up repeating questions (provided you can find the person again) and generally wasting a lot of valuable time.

Adventure games are becoming increasingly sophisticated and complex. The first one I ever played was Scott Adams' *Adventureland* for the VIC 20, a great beginner's game, with underground caverns and sleeping dragons and all kinds of nifty treasures. I loved it, but the game could handle only a fairly limited number of two-word commands, and I spent a lot of time playing "guess my word".

A game like *Suspended* or *Zork,* on the other hand, can respond to a wider range of words, in normal English configurations. That's because the newer games have a larger vocabulary built in (usually several hundred words). True, that's still pretty small compared to normal speech. And even a complex game like *Deadline* has pretty strict limits on what you can do, where you can go, and how you can get there. Nevertheless, the games are getting more and more flexible, providing more and more options for the player, getting closer and closer to real-life simulations. Some day some genius programmer could create a game that's so believable you may have a hard time separating it

Adventuring with Scott Adams

BY ANDY FINKEL

In the world of computer games there are two main categories: arcade style games (shoot-em-ups) and adventures. (I know, I know, lately there have been quite a few that contain elements of both, but if you're going to start arguing now, there's no point in my continuing. Right.) Certain people only play arcade-type games. Others swear by adventures. Most people like both. The games I write are basically arcade style, and even I like adventures.

But exactly what is an adventure? Everyone knows what an arcade-style game is by now; it would be hard not to. But fewer people are really familiar with adventure games.

Let's use one of the most famous series of adventures, the Scott Adams series, as examples (The fact that Commodore sells them is a fortunate coincidence. Really.) In a classic Scott Adams adventure, you are given a mission to perform (which may range from defusing a nuclear device to collecting 12 treasures, to…). You communicate with the computer by means of two-word commands (take knife, eat bridge, play ball, whatever). The computer tells you what you see, and what happens when you do something. Unlike arcade games, the adventure actually takes place within your mind. The quality of the descriptions is of course very important.

One way to look at an adventure is to imagine that it is a contest between you and the adventure author. Can you outsmart him (or her—Alexis Adams, Scott's wife, also writes adventures) and solve the adventure? It is more fun when the author has a sense of humor. (Like in the Scott Adams series. Advertisement.) There are some really funny moments in them. (There's a certain mongoose in *Pirate Cove Adventure*…)

If you want a break from shooting still another mysterious alien, and want something completely different, try an adventure. You might get hooked. I know I did.

Scott Adams adventures range from ones suitable for beginners (*Pirate Cove Adventure*) to more advanced (*The Count*) to almost impossible (*Savage Island*), so there's something for everyone.

Now that I've convinced you to rush out and buy a Scott Adams adventure (You mean you haven't heard of the famed Arcade Addict Deprogrammers? They are the people who drag players out of arcades to a home computer and force them to try adventures to save their sanity, not to mention their trigger fingers. No, sorry, that's silly. Forget I mentioned them. Anyway…), there are a few hints for playing adventures that I can pass on. First, use the SAVE GAME features. By saving the adventure, you have the freedom to try silly things knowing you won't have to start from scratch if you make a mistake. (I must have run through the final five turns in *Mission Impossible*, the nuclear reactor one, at least eight times before I got it.)

The other hint I can give is this: when you find an object and don't know what to do with it, try things, even if you know it won't work. If you find an axe, say, try "Cut tree", even if there's no tree in sight. If the adventure answers "You can't do that… YET!", you know you're on the right track… just look for a tree. (When Scott Adams heard people were doing this, he changed this on some of his adventures. So it might not always work, especially on the later, more difficult adventures.)

from the real world. This would not be impossible.

I was going to tell you about the humor that shows up in most adventures, usually unexpectedly, often when you're in an impossible situation. Suddenly an off-the-wall remark will come up on the screen, usually to chide you for some stupid move you've made. (Scott Adams is notorious for a couple of his well-placed jokes, but I've also found these tidbits in just about every adventure I've played.) I know I'm being vague, and I'd love to give you some concrete examples, but then that would ruin the joke, wouldn't it? So you'll have to find them for yourself.

If you already are playing adventures I'm sure you'd love some hints on specific games. So would I. For instance, why *did* Mr. Coates run off after he finished reading the will? Better yet, how do I get to talk to him? (Actually, I think I've got that one figured out, but it means starting the game over.) But if you're just dying for some hints, maybe I'll squeeze in just one—be VERY careful about opening doors in *Suspended.* That's all you get. Any more would be as bad as giving away the end of "Return of the Jedi".

On these pages you'll find reviews of adventures now available from Commodore. I use the term "review" loosely, since it's very hard to review an adventure in the traditional sense without giving away its secrets. You should, however, get an idea of the general gist of the games from what's here. Pick one and... *bon voyage.* **C**

Twelve Hours to Find out Whodunit

BY DIANE LEBOLD

The rolling lawns of the Robner estate are lovely and well cared for; Angus McNabb sees to that. The roses, which the late Marshall Robner loved so much, are particularly gorgeous this time of year, and the orchard is heavy with luscious fruit. But I wish I'd stop bumping my head on the front door every time I try to get into the house. I'm getting a miserable headache and my forehead is black and blue—not very dignified for a police inspector.

I am, you see, investigating the sudden death of Marshall Robner, wealthy businessman and philanthropist, whose body was found yesterday morning on the floor of his library. There he was, sprawled next to the desk, deader than yesterday's coffee grounds. A self-administered overdose of the sedative ebullion, the coroner concluded.

It made sense. Mr. R had been depressed over business problems. But, on the other hand, Robner's son, George, didn't like his father much (the feeling was mutual). And the family lawyer, Mr. Coates, said Robner was about to change his will. Chances seemed at least fifty-fifty that Mr. R hadn't been THAT depressed, and that someone else had helped him along toward an untimely departure from the planet.

But who? Ms. Dunbar, Robner's lovely, ambitious secretary? Mrs. Robner, who was jealous of the time her husband spent with the attractive Ms. D? Could it have been Mr. Baxter, Robner's business partner? Or was it the obvious suspect, George—Robner's willful, spoiled son, who had made it his life's work to spend his father's fortune on booze and fast cars?

My style (learned from watching years of "Columbo") is to ignore the obvious suspect. Especially when I find him eating red herrings in the dining room. But everyone else has an alibi, including Mrs. Rourke, the gossipy (but tidy) housekeeper, and so far the clues I've found haven't been too much help. Maybe I should get Mrs. Robner's "Sneezo" cold medicine analyzed. Where IS that sergeant with the youthful demeanor who runs things down to the lab for me?

Three hours gone. Have I missed any rooms in the house? What about that garden shed down by the lake? Maybe I should look under the beds this time around or under the library desk. No. By the time I get all the way back to the library it will be time for the reading of the will, so maybe I'd best prowl around the grounds for a while and see if I can scare up any footprints. Oops, there's McNabb again, screaming at me for tromping through his roses. That man is a fanatic. Wonder why nobody else in the house knows very much about him.

Well, one thing is sure. If I don't make an arrest by eight o'clock tonight, Mrs. Robner is throwing me out of the house, and my investigation is over. What a humiliating thought. And even if I make an arrest, will the grand jury give me an indictment? I've got to be very careful, and make sure I've got all the evidence before I make any accusations.

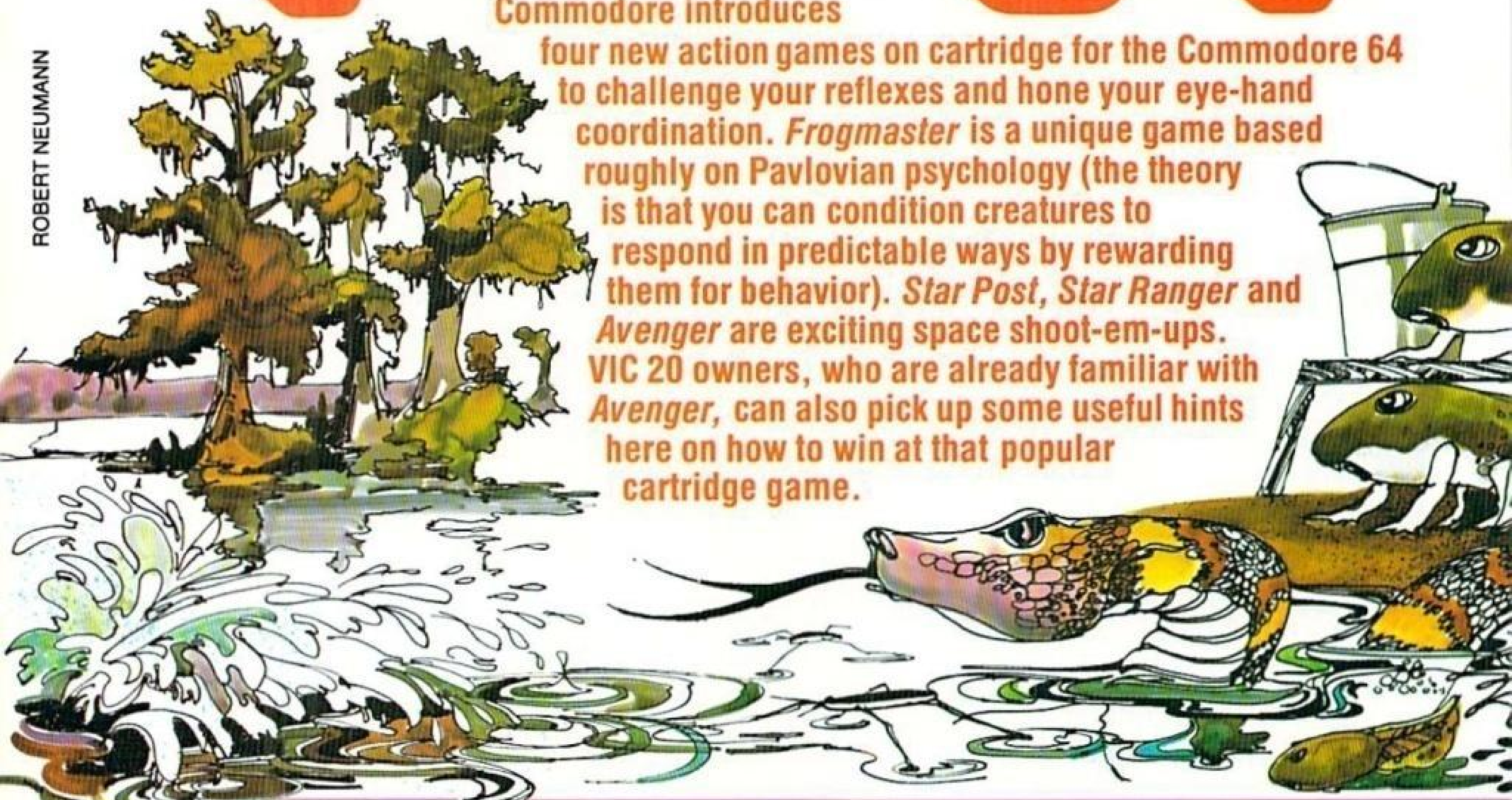
It's a vicious *Deadline*, to have to solve this case in twelve hours. I'd like to see you do it. Care to join me?

4 for the 64

BY STEVE FINKEL

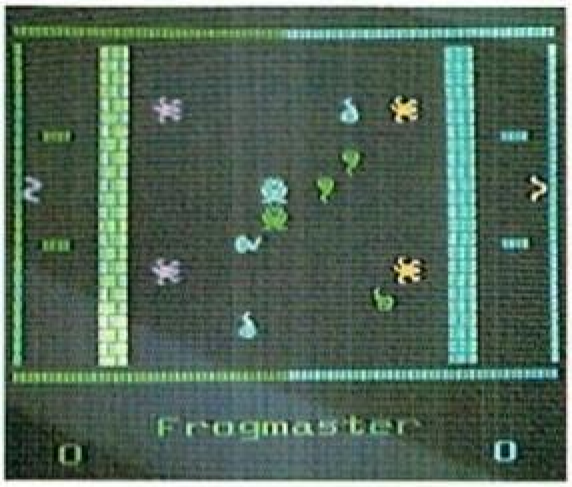
ROBERT NEUMANN

Commodore introduces four new action games on cartridge for the Commodore 64 to challenge your reflexes and hone your eye-hand coordination. *Frogmaster* is a unique game based roughly on Pavlovian psychology (the theory is that you can condition creatures to respond in predictable ways by rewarding them for behavior). *Star Post, Star Ranger* and *Avenger* are exciting space shoot-em-ups. VIC 20 owners, who are already familiar with *Avenger,* can also pick up some useful hints here on how to win at that popular cartridge game.



The Frog Master Speaks:

An Exclusive Interview

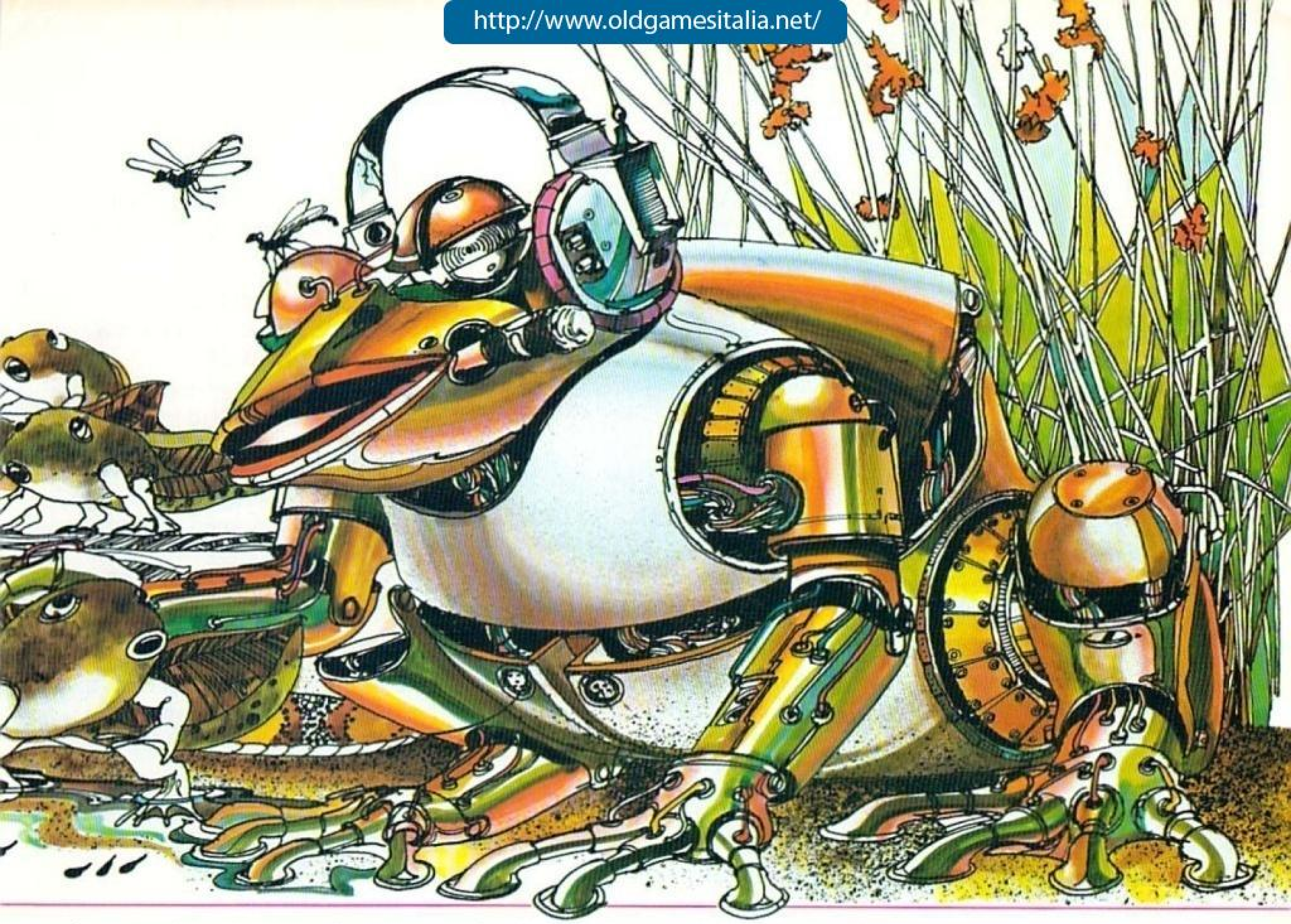


When I finally tracked down Newt Frogknee, possibly the most formidable Frogmaster coach and trainer ever to guide a team of tadpoles, he initially declined to give me an interview. I had tracked down the legendary coach in the muck and slime of a swamp in the bayou that would have made the Johnstown flood look like a goldfish pond. He made some threatening gestures toward me; he apparently felt I was a rival coach who had followed him there on a scouting mission trying to lure away his best-looking recruits. I tried to convince him that nothing could have been further from the truth, that I was a sports writer after an interview. But the gruff coach, in a display of that famous temper of his, smacked me in the face with a handful of mud.

Muddied but unbowed, I was still determined to get my story. After all, this was the man who had guided a team of young, untested tadpoles and over-the-hill frogs, molding them into an almost unbeatable machine. Under his tutelage, they were not just a bunch of amphibians; they were an awesome example of the height of coaching genius, the whole being greater than the sum of the parts. This was the earmark of a Frogknee team, the willingness to sacrifice individual talents, even one's life and baby tadpoles, for the team and coach. The story had been repeated several times, with different casts of characters, but always with the same end result: victory. His teams had competed in (and usually won) all the major bowl games: the Turtle Bowl, the Goldfish Bowl, the Weevil Bowl, the Dust Bowl—all the biggies.

The man was truly a great one. Unfortunately, he was also a stubborn one. Not only was he refusing to talk to me, but he was also directing many strong young frogs to use me as a tackling dummy (a task they attacked with great zeal).

I had given up hope of ever getting my interview and was retreating when I felt a pull at my side.



It seems that a hungry alligator had decided to fix himself a snack of spare ribs, and was searching for mine. The great coach saw this, and after one of his famous guffaws, consented to do this interview. As we spoke in the back of the ambulance that rushed me to intensive care, Newt remarked, "Kid, you got guts. But they're leakin' out yer side." The coach enjoyed another great laugh at my expense, but I stopped his sick sense of humor short by bleeding on his pant leg. We then began the interview that cost me 28 stitches in my side and a huge dry cleaning bill.

Me: Coach, how exactly do you do it? You are one of the all-time great Frogmaster coaches; your teams are routinely spectacular. What's your secret?

Coach: There is no secret. It's a matter of rewarding your players when they deserve it. You'll never see me rewarding a tadpole or frog who doesn't deserve it! On the other hand, I'll seldom miss a reward when a frog is moving in the right direction. The right rewards mean the right moves. That's a good guideline for any coach.

Me: Your players haven't made many mistakes over the years.

Coach: Oh, I've had my share of screw-ups. Sometimes you get a tadpole that gets out there and just doesn't know which way to go, and he catches encouragement from the other coach and decides to try and score AGAINST you! I remember a game when I was just starting out coaching where the opposing coach rewarded my players so well that the entire contest consisted of all the players, even mine, storming my goal line. My poor snake goalie quit right after that game, and I didn't blame him one bit!

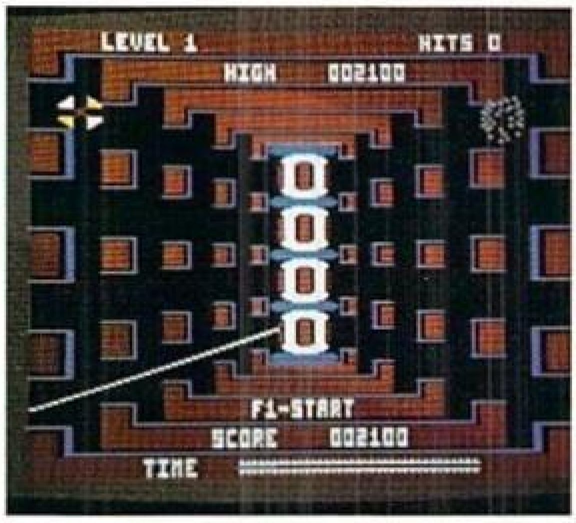
Me: Of course, things have changed since then. You're more than likely to do that to an inexperienced opponent now. A question I've always wanted to ask you: How do you manage to stay so sharp? You always seem to be so well-prepared for your opponent. How is that?

Coach: Practice, practice, and more practice. I practice my team against a team controlled by a computer, with a handicap, at different speeds, with different numbers of players. If you can beat the computer's team, you're a damn fine coach. Not to blow my own horn, but I can take the computer three out of five. This keeps me ready for any challenge posed by another coach.

Me: You mentioned the number of players. How many players do you prefer to use?

Coach: I always say "the more the merrier". When there's nine players on each side, that creates a situation where your coaching skills are really tested. You must try to pay attention to 18 frogs or tad-

Star Post Log



STARDATE: 98.86.125
STAR POST LOG ENTRY #1
CPL. J. F. WEAVER

I've established my command here. Some command, me alone against any alien pilot who feels like buzzing my sector. Still, it's really quiet, and I'd swear I could even see Venus from here. This place is in the middle of nowhere. Actually, it's on the edge of nowhere. The middle of nowhere is a couple hundred thousand miles to the left. Either way, it's pretty dull. I think I see something coming up on the viewscreen, and it sure ain't Luke Skywalker. Be back soon.

STARDATE: 98.97.125
STAR POST LOG ENTRY #2
CPL. J. F. WEAVER

I've just survived my first trial-by-fire. I had gunned down one alien cruiser, when all of a sudden about a dozen more were right on top of me from out of nowhere. It was like driving in New York City during rush hour. I had to continually whirl around, firing in all directions, and still didn't stop all of them. Three got through before the attack ended, so it looks like I'll have a little repair work ahead of me. Still, I think that they'll think twice before wandering in front of my gunsights again.

STARDATE: 98.02.127
STAR POST LOG ENTRY #3
CPL. J. F. WEAVER

Not only have I completed repairs and had breakfast, I had to shoot up another wave of attackers. I don't know what kind of fool they think they're dealing with here, but as long as they keep coming at me, I'll keep gunning them down. Their attack seems disorganized at first, but you realize that by attacking from any direction, they're really testing my skill at maneuvering and shooting. I think I see another attack formation approaching. You'd think they'd get tired of getting shot down.

STARDATE: 98.77.132
STAR POST LOG ENTRY #4
CPL. J. F. WEAVER

Frog Master Continued

poles, and effectively reward the right ones at the right time. This is tough for many inexperienced coaches, but challenges are made to be met and conquered. Make sure you get that quote right, 'cause it's one of my better ones.

Me: That's one of your BETTER ones? (The coach shot me a nasty glance, and I hurried up with my next question.)

Me: What level do you most like your players to compete at?

Coach: I personally will usually have them play either the standard or advanced game. I left the practice game, when each team only has one frog, behind years ago. It was useful for me to develop my coaching skills, but I need the challenge of the STANDARD and ADVANCED games. I particularly like the advanced game with the walls that the tadpoles have to break through and the frogs have to leap over to score. It gives me a great pride in my players when I see them bash into a brick wall in an attempt to break a hole in it for the good of the team. I think the walls provide an additional challenge, and you know how I feel about challenges.

Me: They're to be kept and monitored... ?

Coach: Idiot! Met and conquered! Another challenge I like is Metamorphosis, when tadpoles turn into frogs, frogs lay eggs, eggs become tadpoles, and frogs die during the course of play. The biggest heartbreak is when you get a tadpole that just hatched from an egg to march downfield, approaching the opponent's goal line as it changes into a frog, only to have it die on you before it scores. But I'll tell you honestly, I have nothing but the greatest respect for a frog that gives its all for the good of the team.

Me: Coach, in your day, you've coached some of the best goalies in the game. Do you have a special touch when it comes to controlling your snake goaltenders?

Coach: That's a pretty good question. You're smarter than you look. As a matter of fact, since a coach has better control over the goalie than over the frogs and tadpoles, I can better use my reflexes and concentration to make my goalie more effective. Another factor in the success of my goalie, and the overall effectiveness of my team, is a good feel for the probability of a frog's next move. It's possible to "track" a player, keeping abreast of the probabilities for his next move in any direction. This can be a great help in defending against the opponent and also guiding your offense. Of course, it is a great challenge even if you've mastered the probabilities... (The coach was obviously waiting for me to spit out his quote about challenges. Due to loss of blood or just that

What an experience! Two more attack waves, and I was definitely in trouble on the second one. The post had nearly taken its limit of hits, and it looked like I was gonna miss a couple more aliens. The Superalien was bearing down on me in a spiral course and I just couldn't track him. I knew if he got to me, the Star Post would be destroyed. At the last second, I unleashed the Superzap. I know I'm only supposed to use them in dire emergencies, but it wouldn't have done me any good if the post were destroyed. Anyway, I let it fly and suddenly, all the aliens in the vicinity were obliterated. It took them a couple seconds to resume their attack, but by that time I was back in control of the situation. I'm starting to wonder exactly what is so important about this post. It must be important, since the aliens keep sending so many ships out here for me to shoot down. But if it's so important, why am I the only one out here? When I ask my commanders, they don't really answer my question. As I check the viewscreen, it looks like the tourist season is upon me again, so I gotta go give them a proper greeting.

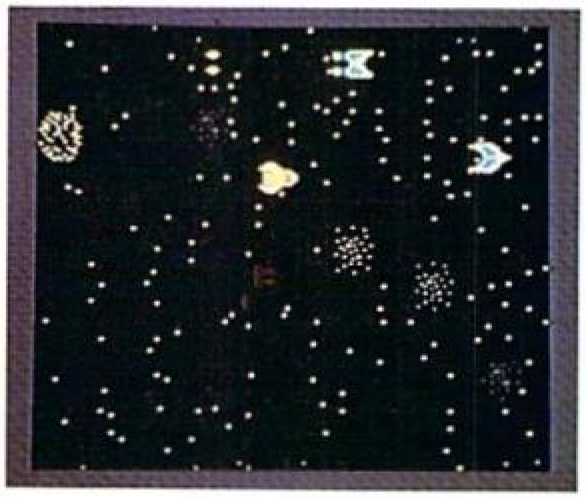
STARDATE: 98.33.138
STAR POST LOG ENTRY #5
CPL. J. F. WEAVER

The attacks are getting harder and harder to fight off. I took 7 direct hits on the post in the last one, and I had to exhaust my supply of Superzaps to help me survive the attack. These ships are coming in a lot faster, and the attacks are getting longer and longer. I wouldn't mind so much if there was somebody else around to take some of the pressure off me, but this post is a one-man show. I wonder what poor sucker they'll send up here after I'm done… I'm only signed up here for three more years, but somehow I don't think I'm gonna qualify for the pension fund. I'm starting to wonder exactly why I was chosen to man this post in the first place. They told me it had something to do with my psychological profile, that their complex personality analysis indicated that I would excell given the responsibility of being completely autonomous in defending the galaxy etc. etc. I think it has more to do with getting caught after hours with the base commander's daughter… but I guess that's just the way the Galactic Army works sometimes. I've gotta remember to ask after the commander's daughter in my next status report—that should cheer the old man up. Well, another attack wave is upon me. I sure wish I had a couple Superzaps left. Looks like I gotta go entertain my alien friends again. This one's for you, Commander. It's gonna be tough to make it through three more years of this, but I'll be there. You can count on it.

I didn't think it was a very good quote, I wasn't sure if I remembered it. I gave it my best shot.)
Me: Challenges are made to be… metal containers?

The coach could not contain himself at being misquoted again on his favorite quote, and showed a flash of his legendary temper by breaking off the interview (as well as my ankle) by slugging me in the foot with an oxygen tank. I had finally gotten my story and lapsed happily into unconsciousness. Unfortunately, this will be my last article for some time, since I'll be laid up in the hospital while my ankle and side heal. The doctors do assure me, however, that I will be out of the hospital in time to cover the Dust Bowl. Who knows? Maybe I'll even get to do a follow-up interview. Let's see now: Challenges are made to be…

Now Showing…



Steven Spielberg isn't the only one who can develop a great adventure scenario. Every time I play *Star Ranger,* when I feel the power behind that joystick as I maneuver my starship through countless obstacles, I become the protagonist of a thrilling space adventure. It's kind of a Walter Mitty thing, but as the action takes place on the screen, I build an entire storyline with character development, plot twists, heroes, and villains. Usually I turn out to be the hero, although I'm pretty humble as far as heroes go.

The story changes each time. This time I'm a weekend pilot who took up flying as a hobby. I've progressed to the point where I'm considered the best amateur flier in my sector. My world has been shattered, however, by finding that the only woman I've ever loved has been brutally murdered at the whim of a spoiled, immature crown prince from the Teflon system.

Prince Bundt has a reputation for spitefulness, exceeded only by his vast ego. The Prince made an unannounced visit to our planet for a hunting expedition, going after the prize game our sand forests offer. After the hunt, the Prince and his hunting party indulged in a feast that would've

Now Showing Continued

given even the most hard-core glutton cause to turn down his after-dinner mint.

Filled with food and wine, the Prince decided he'd like a taste of the waitress as well. The waitress, of course, was my beloved Curad. When she spurned his advances, the Prince simply pulled out a blaster and disintegrated her—one part of her anatomy at a time. On the plus side, he did leave a big tip.

His ministers, wishing to avoid an incident, simply bought the silence of everyone involved.... except me. When I returned to find my Curad slaughtered and the Prince gone, I swore that I would have my revenge. Unfortunately, the Prince was certain to reach his home planet before I could ready my ship for the journey and would be safely ensconced in his fortress when I reached his planet. The Prince's royal status guaranteed his safe passage to his home planet. My voyage would not be without its challenges.

I left from the spaceport in the dead of night to avoid being seen. As my home planet receded in the rear viewscreen, I realized that I would never return. I was determined to face the Prince, but had no clue about what I'd do or where I'd go (if I survived). I was shaken from my mental wanderings by a laser blast exploding nearby. My ship was under attack from the Nasties. I'm not sure what their name means in their own language, but the low growl that they speak in makes it sound a lot like Nasties.

Nasties are kind of like bullies. They won't attack you unless the odds really favor them, and then they come out of the woodwork. Their ships are much slower and less maneuverable than mine, and their weapons don't have much range. I'm not surprised they chose me for a target; since I'm flying alone I must look like a complete pigeon. But they shouldn't forget what a pigeon can do to breadcrumbs, let alone statues.

The combat was short and spectacular. I maneuvered my ship to keep them shifting directions; when they had to turn around to try to follow my ship's course, I would buzz their crafts and blow them away before they had a chance to react. After a few passes, there were no more Nasties willing to face me.

I continued on warily, knowing that I would soon be passing close to Saltine 9, power base of the Bombers. The Bombers were named for their propensity toward bombs; they abhor laser and photon fire, feeling that it is uncivilized to destroy something by shooting it. Apparently, their quasi-religion forbids the action of shooting, because it amounts to directly taking lives. But the Bombers are also an extremely private life form, so they needed to develop a protection, to discourage attackers and prying outsiders and protect their privacy. They became Bombers.

Any passing force, be it a single craft or an entire fleet, will be faced with the task of eluding the Bombers. The Bombers will pepper the flight-paths with land mines that explode on contact. They accost each ship that passes with no exception; usually, it is wise to detour around Saltine 9, but I am in something of a hurry. Although their ships are relatively slow, it is difficult to hit a Bomber craft with laser fire, since they are experts at evasive movement. But it is imperative that you do destroy them, because they will litter your path with their mines and totally block your way, even if you mean them no harm.

It is said that no outsider has ever actually seen a Bomber up close. I don't doubt it, because there's something almost suicidal about them. Bomber pilots will often try to collide with your ship, sacrificing themselves in order to destroy intruders and preserve their planet's privacy.

And here they are now...

I don't enjoy destroying Bombers, since they only want to maintain their privacy. But it's either them or me, and I have an appointment with Prince Charming's stepbrother. My basic strategy is to shoot them only when I have to. I usually try to get in front of them and destroy them by hitting them with my exhaust jets as they come up behind me. This accomplishes two things: first, if I can stay in front of them, I don't have to avoid their bombs; secondly, by killing them without firing a shot I create a terrific sense of poetic irony, which I somehow don't think the Bombers appreciate. That is basically what happened. Every time the Bombers tried to approach me from behind, I gave them a quick blast from my exhaust, and continued on. The Bombers left me alone as I departed from their galactic turf.

I could not relax for too long, however. I was almost immediately attacked by a wandering band of Cibollians. Cibollians are the pirates of the system. They have a strange custom that requires all young Cibollians to man pirating crafts when they are presumably old enough to take care of themselves. This is their rite of passage; it is surprising, because the mature Cibollians are a peace-loving race and don't have any other space force besides their pirating hordes. This sometimes gets them in trouble, and they are constantly forced to migrate from system to system. They are often good for a laugh, since their pilots are usually inexperienced. Their ships resemble multi-colored cosmic marshmallows, and although they are equipped with powerful weapons, their firing range is limited.

To repel their attack, I lured them, two at a time, to a spot where I could circle around them and fire. I avoided their weapons because of their limited range, and my superior mobility allowed me to run circles around their inexperienced pilots in their slower crafts.

I started preparing myself for the final approach to the Prince's planet. I knew I would have to be sharp, because by now he must've had word of my coming and would no doubt be prepared. While my thoughts focused on the possibilities for traps that I would face, I barely realized that I had navigated directly into an asteroid shower. Cursing my own stupidity, I frantically manipulated the controls, weaving in and out of the moving asteroids. I regained control of the ship, and steadily steered a course through the asteroid field. I emerged slightly shaken, but as determined as ever. I was approaching the Teflon system.

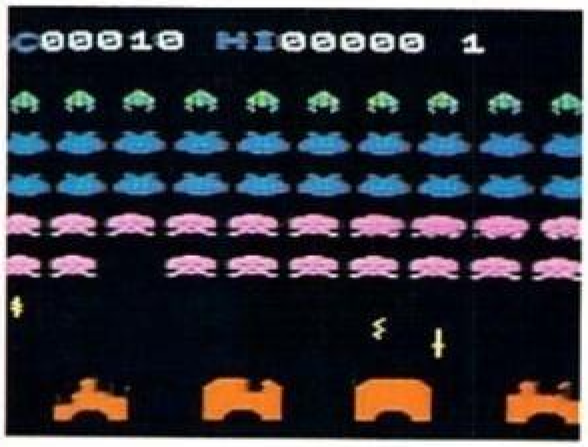
I expected an elaborate welcoming committee and I was not disappointed. The Prince had hired the most feared hired guns in the galaxy, the Invisons, to protect him. Invisons are feared not only because of their skill as pilots and their deadly weapons, but mainly because of their sophisticated spacecraft. The Invison technology has developed ships that have a temporary invisibility cloaking device. They simply appear, shoot at you, and disappear again. They also cannot be hit when invisible. They are dedicated fighters and will battle to the death if they are hired to do a job. I was indeed up against formidable foes. I immediately took the offensive, charging the first Invison to appear. I just wasn't quick enough... another appeared behind me, then another. Soon, I was surrounded by several Invisons flashing in and out of existence.

I started to try to soar in between two approaching Invison ships... mistake... Invison fire lit up my ship and it was all over. Was my attempt at revenge thwarted? No! I had two more ships remaining. I guessed that the Invisons would have been aggravated that I was pulling the old three-ship routine, but it's MY video game and MY story, so I can do whatever I want. This time, I had better luck against the Invisons. After several close calls, I defeated them by anticipating where they would reappear, shooting and then quickly retreating. I then approached the docking base unchallenged. While there were no ships or enemy fire to deter me, it was still difficult to maneuver my ship through the subterranean tunnels to the docking base. But I made it, and readied myself for the showdown.

As far as the outcome of my conflict with the Prince, I'll leave you to guess what happened. It's time for a new script, with new characters, new plot developments, and maybe a new outcome. This space adventure stuff can get to be very absorbing; I would advise you to try it and see what you can come up with. Remember: after you've gotten through level one and killed the Prince, escaped the galactic posse, located your long-lost Aunt Bertha, or whatever, then there's the more challenging level two. And that's another story just waiting to be told.

Everything You Always Wanted to Know About Winning at Avenger*

*that I feel like telling you right now



"Winning isn't everything. It's the only thing." These words, uttered first by Vince Lombardi and repeated by scores of overbearing coaches and fathers who've lost their perspective on child-rearing and life in general, have inspired countless little leaguers, weekend quarterbacks, and high school athletes to do anything within their power to taste the thrill of victory, leaving their opponents to swallow the agony of defeat.

Values such as good sportsmanship may be good for an honorable mention now and then, but in the end it's the winner who rides off into the sunset with the girl and the gold. Why settle for Miss Congeniality if you can take home the big prize? The aim of this article is to pinpoint exactly how one can become a world-class competitor and gracious victor at the game of *Avenger* specifically, although the basic principles can be applied to any form of competition.

Avenger is a game for one or two players. It is the latter version we are concerned with. For those not familiar with the game, *Avenger* features a formation of alien invaders who close in on your craft on

Everything You Always Wanted To Know Continued

the planet's surface, dropping bombs and laser fire as they travel back and forth across the screen while you try to destroy the whole formation. It is an interesting game to play alone, but against an opponent the game takes on a new dimension. When you emphasize victory at all costs, you can adopt one or more of several different strategies for whipping your opponent. Each method has its own distinct flavor and each lends unique characteristics to the competitive arena.

Method One:
Fair Play, Hard Work, And Superior Ability

This is the hold-your-head-high, grit-your-teeth, All-American way to become a winner. It involves developing your reflexes and honing your skills in *Avenger* to a level so lofty that the aliens mutter "Oh no, not him again!" when you grab the joystick.

To become a true great, you need not only natural skills, but also mental toughness and dedication. There will be times when you'll realize that other things in life are important besides becoming a great *Avenger* player (such as meals, births in the immediate family and winning the lottery), but you'll also realize how overrated those things really are.

Get used to your parents, children, spouse, and friends becoming irritated because they can never watch TV due to your constant involvement with the game. Tell them there's nothing good on anyway. Get used to hearing comments like, "Is that joystick surgically attached, or what?" Sometimes one must undergo true hardship to achieve greatness, and sarcasm is just another test of one's spirit.

Method Two:
Beating The System

This is also an All-American way to triumph over opponents that are just not as sharp as you. This involves using your intelligence, guile, and mental acuity to develop the most effective system to "beat the game". Are these not the skills that made this country great? Well, I think so anyway.

An effective strategy can allow even the most uncoordinated, under-talented loser to become a dominating, over-confident egotist… in other words, a winner. The most effective strategy I've come across is shooting out the far left (or far right) columns, which causes the entire formation of aliens to take longer before advancing toward your ship on the planet's surface. The formation advances when it reaches the end of the screen, so if you keep shooting all the aliens in the column nearest the edge of the screen, it will take them longer to reach that edge.

Also, the formation speeds up as you destroy individual aliens. To keep it from moving too fast too soon, one must leave the end column alone at a certain point and shoot the lowest aliens in each row. This takes a fine sense of judgment to know exactly when to change the focus of your attack without having the aliens speed up, but if you can master the timing the game will be a breeze.

To rack up more points, one might also discover how to "unrandomize" the point values for the Mystery Ship that floats across the top of the screen. On certain shots, specifically your twenty-third shot and every 15 thereafter (if you count each shot you fire), you can get the maximum point value for the Mystery Ship in the VIC version of *Avenger*. You might be able to do the same with the 64 version and you might not. Since it's not inconceivable that I might be challenged to a game for a substantial amount of money by someone reading this article, I'll leave you to your own resources to figure that one out.

Method Three:
Distraction

You may be noticing now that there is a decreasing legitimacy to these methods as you read further along. Distraction, while not being immoral, is generally frowned upon by people who have mastered either of the first two methods. But let's face it: if you still have not gotten the hang of those two methods, distraction can be a very useful competitive tool.

Distraction requires creativity, aggressiveness, and often convincing acting skill to be effective. While your esteemed opponent demolishes his ninth or tenth consecutive rack of aliens, and you languish, unable to conquer even level one, a distractor may be just the thing to break his concentration and bring him back down to your level. Some distractions may be verbal in nature: "Was that the telephone I heard ringing just now?" or "Did you see that rabid dog in the kitchen?" Subject matter is often important. Which statement is more likely to grab your attention? Would your concentration be shattered more by someone uttering, "Sure looks like rain today" or by an excited query of, "Wasn't that Chairman Mao in that UFO with a cure for cancer?" I think the answer is obvious.

Sometimes verbal distractors just aren't effective, and more elaborate productions may be required. I once thrashed an over-confident opponent when I brought the entire Osmond Family in to sing a medley of popular movie theme songs in the middle of his third rack.

A general rule of thumb for distractions is: the more outrageous, the more effective. Fake death scenes, however, are discouraged, since there is a certain "boy who cried wolf" effect involved.

Therefore, I would recommend using this ploy only if you are in good health or are certain that the other person won't do anything as to actually cause you to experience the "boy who cried wolf" effect. The bottom line is that a distractor can be an effective strategy and also a lot of fun if you like making your opponent gnash his teeth.

Method Four:
Intimidation

The effectiveness of this method depends a great deal on the physical characteristics of you and your opponent. This is not recommended if you weigh under 90 pounds or your opponent is wanted for manslaughter in more than three states.

If you do think you can bring it off, intimidation can be a particularly effective tool in winning consistently. One drawback is that your supply of opponents (and friends) may dwindle dramatically if this strategy is overused.

Intimidation can range from the harmless to the extreme. The lighter forms of intimidation include glaring at your opponent, cursing under your breath at your own mistakes and your rival's successes, and becoming visibly angered at your own inability to play the game. Some of the more serious ways to intimidate your opponent are screaming obscenities while banging the table with your shoe when your opponent nears the end of a round, sticking pins in a doll that bears an uncanny resemblance to your opponent, and paying someone named Dutch to break your opponent's fingers as he tries to play.

Intimidation comes a lot easier to some people than others, so be sure you can take care of yourself before trying anything too extreme. A word of warning about using intimidation to win at *Avenger*: once you use it, expect to be labelled a "poor sport". At this point, you can remind those snivelling losers of Vince Lombardi's words quoted at the beginning of this article. And for heaven's sake, don't try to intimidate anyone named Dutch!

Method Five:
Outright Cheating

Cheating carries with it a uniformly negative connotation. "Cheaters never prosper" and "Cheaters never win and winners never cheat" are two sayings that sum up our culture's view of those who chose not to play by the rules. They are, of course, entirely incorrect and quite misleading. Some of our most successful businessmen, politicians, and game players have done extremely well with an underdeveloped sense of fair play. We are brought up to believe that cheating is "wrong" and that only "bad" people cheat. But you may also recall that many are brought up believing in Santa Claus, fairies, and other fallacies. So why cling to thoughts that are really reminders of bitter childhood disappointments? It's time to leave the past behind!

If you have failed to master the intricacies of the first four methods, cheating offers yet another chance to be a winner. There is an almost unlimited number of options available to the really creative cheater. A major challenge (and what makes cheating an art) is pulling it off without causing your opponent to suspect your integrity in the least. Successfully cheating an opponent who knows he should've won leaves him feeling puzzled and frustrated.

Cheating, while not the most ethical way to win at *Avenger*, can be as gratifying as any other method. I would not recommend cheating for most players, because there is more than a little potential to wind up disgraced, ostracized or even physically abused. If the opponent you've classified as having the awareness of an English muffin turns out to have quick eyes, a short temper, and a lightning-fast left hook, cheating may seem like a poor choice indeed.

Some of the more obvious and effective ploys (without giving away too many secrets) involve a slight misdirection of your opponent's attention. If my opponent is beating the pants off me, one of my favorite maneuvers is to wait until he's not concentrating and play during his turn. I get his score, and suddenly he's way behind trying to catch up to his own score! Since *Avenger* for the 64 only plays with one joystick out of control port #1 for both players, the potential exists for an elaborate pre-meditated cheat. Attaching both joysticks and giving your opponent the useless one hooked up to port #2 and controlling his game with your working joystick is a great ploy that is often successful and hard to detect. The key element is how convincingly you handle his "game".

There are, of course, scores of other ingenious ways to cheat, but most are far too diabolical to be revealed here. My best advice to you on cheating is: If you must cheat, DON'T GET CAUGHT! If you do get caught and try to implicate me, I'll deny everything and you'll be on your own. Remember, the only thing worse than losing is cheating and still losing. Actually, there are probably a lot of worse things than either of those alternatives.

So those are the five methods, each effective in its own way. Try them out, combine them, enjoy them; when you decide on a method and style that suits you, make it your own. Then go out there and show the world how to play *Avenger*! Remember: Winning isn't everything… I'm sure you know the rest. C

Saving High Resolution Screens

Last issue, Jim gave you some insight on how to create bit-mapped graphics on your Commodore 64. Now you find out how to save your screens, so you don't have to keep starting over when you create a really good one.

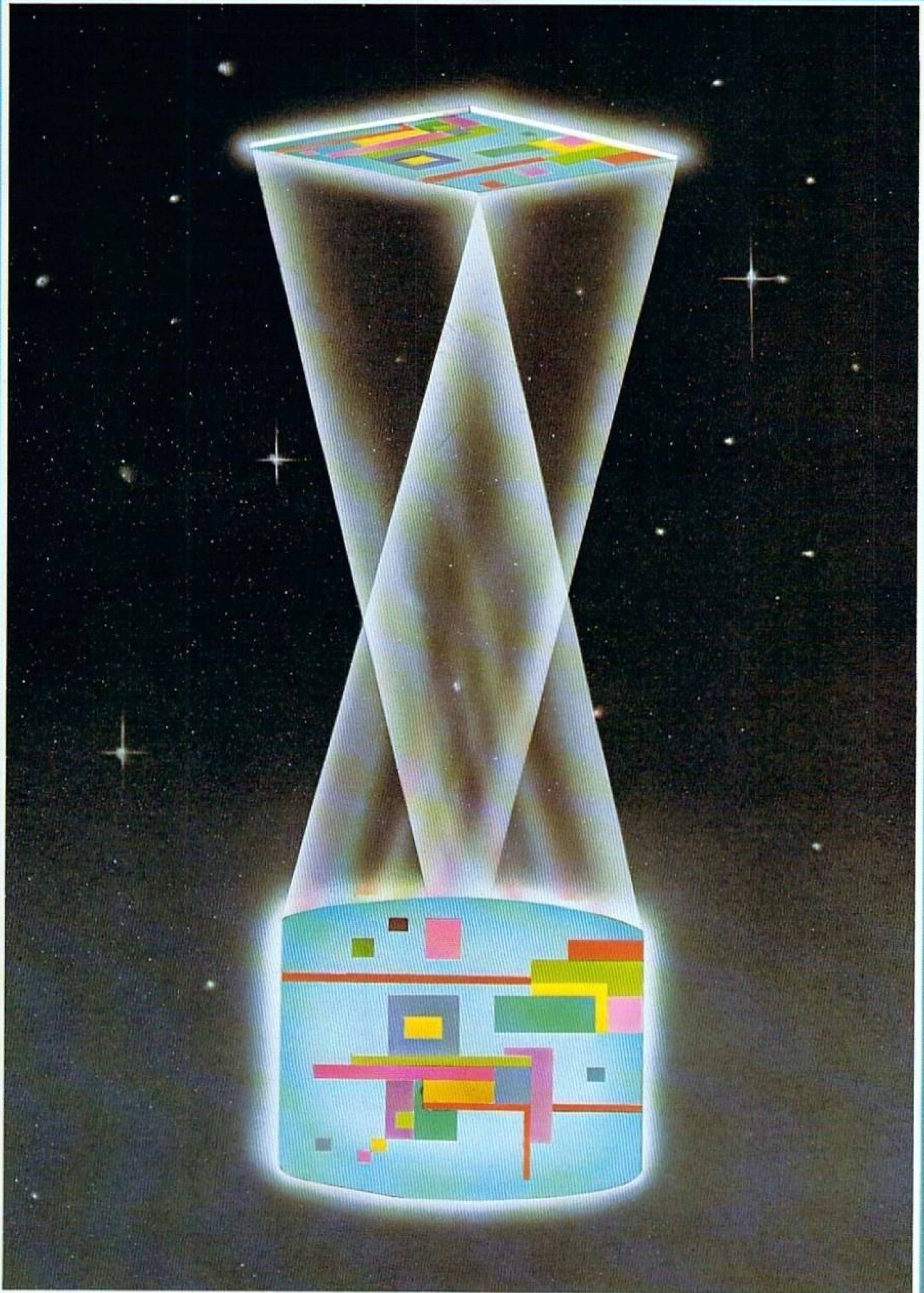
BY JIM GRACELY

There comes a time, working with bit-mapped graphics on the Commodore 64, when simply drawing on the screen is not enough. Suddenly it becomes important to save the screens. Perhaps you've drawn a masterpiece with a joystick painter, maybe the design you've created is destined to become the art *piece de resistance* of the 80's or maybe you just have a nifty doodle. Whatever the reason may be, you need to be able to save your screens to tape or disk and be able to recall them again later. This article will present not one but two (2) ways to do just that. The first save/recall programs use a sequential file to save the data and the second pair of programs uses (now don't get squeamish) the Kernal SAVE routine.

The Data

A brief review of the mechanics behind bit-mapped graphics will remind us that the screen is actually displaying 8000 bytes of memory from 8192 to 16191. One important result of this is that using RUN/STOP RESTORE will *not* affect these 8000 bytes; neither will using the NEW command or loading in a program (as long as it is less than 6K). This is certainly good news! Once a design or drawing has been completed, the program can be ended and a new program can be loaded to save the high resolution screen.

With this new knowledge we can now consider the contents of the 8000 bytes of memory that the high resolution screen uses. When the bytes are displayed on the screen they appear as dots (or pixels), but in memory they are simply numbers. If you were to look at each of the 8000 locations from 8192 to 16191 you would find a number between 0 (all eight bits 0) and 255 (all eight bits 1) in



CARMEN CONSOLE

each location. So to save a high resolution screen, what we actually have to do is save 8000 numbers.

Sequential Files

The information presented so far may be just what some of you needed to understand how to save high resolution screens, and you're now ready to run off to your favorite sequential file program. If you are one of these people then feel free to skip this section, but be sure to rejoin us later when we start discussing the kernal routine. In the meantime, let's talk about sequential files.

A sequential file can be thought of as a list. It can be a list of anything and can be just about as long or as short as you want it to be. An everyday equivalent of using a sequential file is a shopping list that you keep in a desk drawer. If you want to start writing your list you have to first OPEN the desk drawer. You can then write or PRINT the items onto your list. Then when you are done, you would put the list back in the desk drawer and CLOSE it. In this example, the desk represents the medium (tape or disk) that you are working with.

Now imagine that you went to the store to go shopping and you forgot your list. So you walk over to the pay phone and call home. Trying to get your son (or daughter, or husband...) to read you your shopping list would be just about the same as telling the computer to read a sequential file. Let's compare the two procedures:

To Johnny	To Computer
Hi Johnny, this is mommy.	No equivalent
I want you to do something for me.	No equivalent
Open the drawer	OPEN
on the upper left corner	1, (which drawer)
of the old desk,	8, (which desk)
and be careful of splinters.	1, (any commands?)
Get the shopping list,	"shopping list, s,
and you have to read it to me.	r"
Read what the first thing is. .....(the whole list)	INPUT #1,a$
Now close the drawer.	CLOSE5 (same drawer)
Thank you Johnny.	No equivalent

The open command in this example was OPEN 1,8,1,"shopping list,s,r". This is the open command for reading a sequential file from disk (the eight tells the 64 to work with the disk drive). If the last letter in quotes were a "w" instead of an "r" then the 64 would write to the file. The same open command for tape would be OPEN 1,1,0,"shopping list". In this open command, the second number is a 1, which tells the 64 to work with the datassette. The third number (0) tells the 64 to read from the file. If this were a 1 then the 64 would write to the file.

Here's a short program to open and write the 8000 bytes of data to a sequential file:

```
500 BASE=8192
510 INPUT"FILENAME";F$
520 OPEN 1,1,1,F$
530 FOR X=BASE TO
    BASE+7999
540 P=PEEK(X)
```

```
550 PRINT#1,P
560 NEXT
570 CLOSE 1
```

If you are working with a disk drive, substitute this line 520:

```
520 OPEN 1,8,1,F$+"
     ,S,W"
```

Line 550 is the only line that might confuse you a little. The PRINT #1 statement tells the 64 to put information *into* a sequential (or any other kind) of file. The line numbers start at 500 so the whole program can be added directly to the base graph program that I presented in the last issue of *Power/Play.* (See page 55 in this issue for the base graph program.)

So this program will save a high resolution screen to either tape or disk. Did I mention size yet? I guess not. Well we're saving 8000 bytes and there are 256 bytes in a block, so the file should be 32 (8000/256) blocks. Unfortunately, sequential files aren't that neat. In fact, each byte that we store with the program uses up to six bytes in the file. This is because a number is stored as a string in a sequential file with each digit using one byte. In addition to this there is a space character before each number and both a space character and carriage return character after each number. Storing a three-digit number therefore uses six bytes.

The result of these extra bytes is that a sequential file containing one high resolution screen uses about 140 blocks. Now that's a lot of blocks! Keep that in mind before trying to use this saving program.

How do you get the screen back out of the sequential file? Basically we just reverse the process. Open the sequential file to read, read each byte and POKE them back into memory locations 8192 through 16191. Here's a program to do that:

```
10 BASE=8192
20 INPUT"FILENAME";F$
30 OPEN 1,1,0,F$
40 FOR X=BASE TO BASE+
   7999
50 INPUT#1,P
60 POKE X,P
70 NEXT
80 CLOSE 1
90 POKE 53272,PEEK
   (53272)OR 8
100 POKE 53265,PEEK
    (53265)OR 32
110 FOR I=1024 TO 2023
    :POKE I,3:NEXT
120 POKE 1024,16
130 GET A$:IF A$<>"
    [SPACE]"THEN 130
140 POKE 53265,PEEK
    (53265)AND 223
150 POKE 53272,PEEK
    (53272)AND 247:PRINT"
    [CLEAR]":CLR:END
```

If you are using a disk drive substitute this line 30:

```
30 OPEN 1,8,5,F$+",S,R"
```

This is a nice little program because in addition to loading the screen back into the 64, it also switches you to bit-mapped mode so that you can see the screen. Just press the space bar when you tire of looking at the screen.

A Kernal Save

When I first wrote sequential saving and loading routines for saving screens, I was just as happy as could be. But then… I started to get impatient. I figured that there must be a way to make this process even quicker. After fiddling with some machine language routines, and getting nowhere, I decided to try the Kernal SAVE routine. Suddenly all my problems faded away as the Kernal routines zipped through their operations and saved each screen in a 32-block program file (remember that 8000 bytes/256 bytes/block = 32 blocks). A program file, you may exclaim! Yes, I retort, and program files can be loaded directly into the 64. Well, hopefully I have you interested enough now to overcome your initial fear of using the Kernal routines.

Here is a simple, eleven-line program, using Kernal routines and *written in BASIC*, to save a high resolution screen:

```
500 INPUT"FILENAME"
    ;F$
510 L=LEN(F$)
520 FOR X=1 TO L
530 POKE 49151+X,ASC
    (MID$(F$,X,1))
540 NEXT
550 INPUT"TAPE[SPACE]
    OR[SPACE]DISK"
    ;D$
560 D=1:IF LEFT$
    (D$,1)="D"THEN
    D=8
570 POKE 780,4:POKE
    781,D:POKE 782,
    255:SYS 65466
580 POKE 780,L:POKE
    781,0:POKE 782,
    192:SYS 65469
590 POKE 251,0:POKE
    252,32
600 POKE 780,251:POKE
    781,63:POKE 782,
    63:SYS 65496
```

Line 500 allows you to name your screen file (no more than 16 characters).

Line 510 finds the length of the file name you entered.

Lines 520-540 set up a loop that stores the ASCII value of each character of the file name. The stored name begins at location 49152.

Lines 550-560 allow you to choose either tape or disk, and set the device number accordingly.

Line 570 sets up the logical file using the SETFLS Kernal routine. This is the equivalent of an OPEN statement. Locations 780, 781 and 782 can be used in BASIC to set the accumulator, X register and Y register. 780 is POKEd with the logical file number (4). 781 is POKEd with the device number (D). 782 is POKEd with a 255, which tells the 64 that there are no special commands. A SYS65466 then runs the SETFLS routine.

Line 580 sets the name of the file using the SETNAM Kernal routine. 780 is POKEd with the length of the file name (L). 781 and 782 are POKEd with the low and high bytes of the location of the file name (49152).

High Byte = INT(49152/256
= 192
Low Byte = 49152 − 256
* High Byte = 0

A SYS65469 then runs this routine.

Line 590 uses memory locations 251 and 252 to store the low byte and high byte of the first memory location to save (8192).

High Byte = INT(8192/256)
= 32
Low Byte = 8192 − 256 *
High Byte = 0

Line 600 saves the 8000 bytes of data using the SAVE Kernal routine. 780 is POKEd with the zero page address that we used in line 590 (251). 781 and 782 are POKEd with the low and high bytes of the last memory location to save (16191).

High Byte = INT(16191/256)
= 63
Low Byte = 16191 − 256 *
High Byte = 63

A SYS65496 then runs this routine and saves our file.

Now you can save all the screens that you want to. All we have to do is find a way to get them back into the 64. I mentioned earlier that the Kernal saves the data as a program file. It seems that all we have to do is put a LOAD command in a program and the screen will load. This is true. However, whenever a LOAD command is *within* a program, the 64 will automatically RUN the program after it is loaded.

There are ways around this problem if we just take a minute to think it through. First of all, we can tell the 64 to load a program back into the same place it came from. If we do that, then when the program tries to run, it will run the same program that we used to perform the load. If we set a marker variable before we load in the screen file, we can check that variable when the program starts to run again and jump to some other place in the program. Here is a program to load your screen files back into the 64:

```
10 IF T=1 THEN 40
20 INPUT"FILENAME";F$
30 T=1:LOAD F$
40 BASE=2*4096:POKE
   53272,PEEK(53272)
   OR 8
50 POKE 53265,PEEK
   (53265)OR 32
60 FOR I=1024 TO 2023:
   POKE I,3:NEXT
70 POKE 1024,16
80 GET A$:IF A$<>"
   [SPACE]"THEN 80
90 POKE 53265,PEEK
   (53265)AND 223
100 POKE 53272,PEEK
    (53272)AND 247:
    PRINT"[CLEAR]":CLR
    :END
```

If you are using a disk, substitute this line 30:

```
30 T=1:LOAD F$,8,1
```

Well, that does it for now. There's a lot of new information here so don't get discouraged if some of it sounds too complicated. Work through the programs one at a time, and look up the Kernal routines in your *Programmer's Reference Guide*. If you stick with it, slowly but surely you will begin to understand the concepts presented here, and you'll be ready for the next step: would you believe some machine language routines to help you clear the screen and change the screen colors? **C**

Base Graph Program for Bit-Mapped Graphics

Use this base graph program, which appeared in the Summer issue, as your jumping off point for the programs Jim presents in this issue.

```
1 POKE53265,PEEK(53265)OR32
2 POKE53272,PEEK(53272)OR8
3 FORX=8192TO16191:POKEX,
  0:NEXT
4 FORI=1024TO2023:POKEI,
  3:NEXT
190 GOTO240
200 CH=INT(X/8):RO=INT(Y/8)
    :LN=YAND7
210 BY=8192+RO*320+8*CH+LN
    :BI=7-(XAND7)
220 POKEBY,PEEK(BY)OR(2↑BI)
230 RETURN
240 POKE1024,16
250 GETA$:IFA$<>" "THEN250
260 POKE53265,PEEK(53265)
    AND223
270 POKE53272,PEEK(53272)
    AND247
275 CLR:PRINT"J":END
```

MAKING FRIENDS WITH SID

PART 4

In this part, Paul shows you how to use the filters in your Commodore 64's Sound Interface Device (SID) to make your Commodore 64 "piano" (see last issue) sound even more realistic.

BY PAUL HIGGINBOTTOM

Have you recovered from the VERY wordy article last time? I hope so, because this time, we're moving onto NEW ground. As mentioned at the end of the last article, we will now explore the capabilities of SID's filter, which has been mentioned a couple of times but not explained fully.

So, what is a FILTER? Let's make a comparison. You've probably heard of, and maybe used, filter paper. It's used in almost all coffee makers. The FILTERing action of the paper in a coffee maker allows very fine particles of coffee to pass through, with the hot water, to form what we know as the drink coffee, but does not allow the larger particles through. Essentially then, the filtering process is one where only PART of the "somethings" involved are allowed to pass through, and the rest is not. In the case of the coffee filter, the water and fine coffee particles can pass through, while the larger ones cannot. A sound filter, on the other hand, allows only a certain portion (or portions) of the sound input to pass through to the output (your speaker and then your ears).

How do we control a filter? Think of a potato grading machine. Such a machine can be programmed to give us a certain selection of potatoes. If we want just the small ones, we allow the potatoes to roll over a tray which has holes in it with the diameter of the maximum size we want. The bigger we make the holes, the more we let through, until eventually, we would have holes so big that everything could pass through. How about if we wanted only medium sized potatoes? The holes would need to be the diameter of the MAXIMUM sized medium potatoes. But this would allow all the small ones through, too, so we would have to let the potatoes falling through the first tray roll onto a new tray with holes slightly smaller than the MINIMUM size. The potatoes smaller than our requirements would fall through these holes, and we would take what's left on the tray (i.e., not too big, and not too small). Similarly, the ones left on the very topmost tray would be the larger ones.

This is quite similar to the SID's sound filtering process. For example, if we only want the frequencies below a given frequency, we use the LOW PASS MODE in SID. This allows only frequencies lower than a specified frequency to pass through to the output. Like the potato sorter, we also have other modes to select different portions. We have BAND PASS MODE, which will allow a given amount above and below a specified frequency to pass through. We also have HIGH PASS MODE (I know, you guessed it!) which will only allow frequencies higher than a specified frequency to pass through.

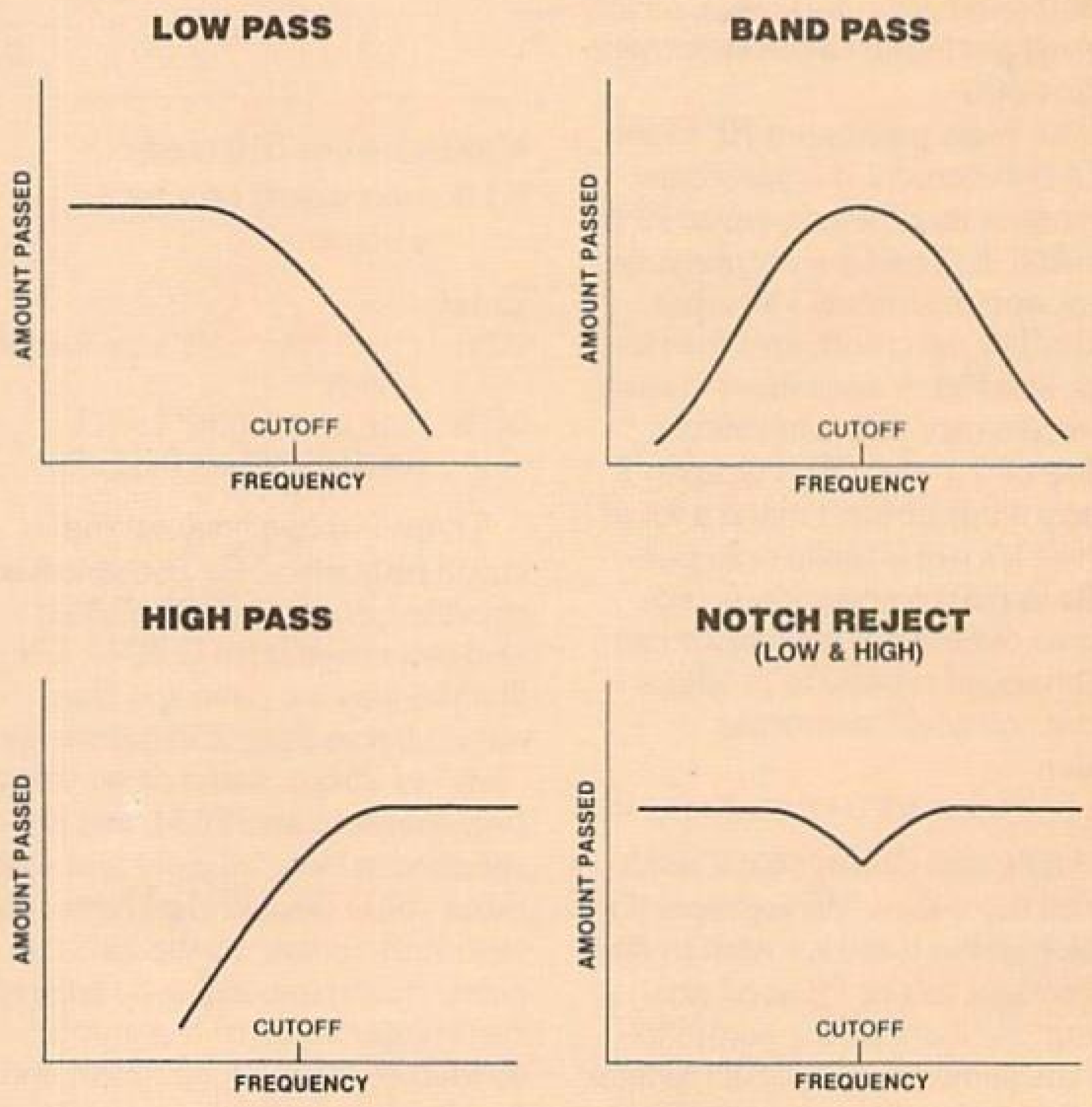
The "specified frequency" I keep referring to is known as the CUT-OFF FREQUENCY. Also, I have made it seem like the filter cuts out completely any sound immediately below, slightly below and above, or above (depending on whether it's LOW, BAND, or HIGH pass). This isn't so; let's take LOW pass mode for example:

As shown in Figure 1, the filter quiets frequencies above the cutoff frequency in proportion to how far above it they are. If a frequency is only slightly above the cutoff, it will be quieted slightly. If a long way above it (relatively), it will practically be cut out altogether.

That's the theory; now the practice. After loading the final program from the last article into your Commodore 64 (see page 59), change the following lines:
Change line 540 to:

```
540 poke sid+24,15+16
```

Figure 1. Filters in the SID Chip



(From the Commodore 64 Programmer's Reference Guide, pages 200-201.)

The addition of 16 to this POKE sets the filter to LOW PASS mode, thus quieting frequencies higher than the cutoff.

For BAND PASS, we would add 32 instead of 16 (quiets frequencies proportionate to how far above *and* below the cutoff they are), and for HIGH pass we add 64 (quiets frequencies below the cutoff). Modes can also be added, so we could have low *and* high pass, so as to quiet frequencies *around* the cutoff (this is called NOTCH PASS, or BAND REJECT).

Change Line 550 to:

```
550 read a,d,s,r,pw,
     c,re
```

The extra parameter C in the READ statement is our cutoff value, which we will put in the DATA statement in line 600.

The extra parameter RE in the READ statement is a parameter not mentioned before, called RESONANCE. The filter emphasizes frequencies (makes a sharper sound) at the cutoff, and the degree to which it does this is known as resonance. We can select a value of 0-15 for this. I wouldn't worry if this doesn't make a lot of sense; it's use is really only possible in machine language programs, where the resonance can be changed rapidly to produce more complex harmonics.

Enter:

```
610 poke sid+23,7+re*16
```

SID's filter doesn't have to filter all the voices. We can specify which of the three we wish to filter. Of course, in our "piano" program, we want all the sound to be the same so we tell SID to filter *all* the voices. This is controlled in register 23. The value 7 equals 1+2+4, and each of the three numbers added are the ones to filter the voices 1, 2, and 3 respectively. The addition of RE*16 is adding the previously explained parameter resonance.

Change line 600's DATA to:

```
600 data 0,10,0,0,800,2000,15
         !  ! ! !   !    !  !
    Attack  ! ! !   !    !  !
            ! ! !   !    !  !
        Decay ! !   !    !  !
V             ! !   !    !  !
A       Sustain !   !    !  !
L ==>           !   !    !  !
U         Release   !    !  !
E                   !    !  !
S          Pulsewidth    !  !
                         !  !
                    Cutoff  !
                            !
                    Resonance
```

Make sure line 510 reads:

```
510 voice=0:oct=3
     :wave=32
```

Enter:

```
620 ch=int(c/8):cl=c-
     ch*8
630 poke sid+21,cl
     :poke sid+22,ch
```

These last two lines set the cutoff frequency, C. The cutoff is specified in registers 21 and 22 and can range from 0-2047. Unlike the way we have specified values larger than 255 before (i.e., "lots" of 256 + some other value between zero and 255), this one is specified in "lots" of eight and some other value [remainder] between zero and seven, so we can calculate how many eights by finding the integer value of the cutoff divided by eight (ch=int(c/8)) and find the remainder by subtracting how many eights multiplied by eight from the cutoff (c−ch*8).

Now to experiment. If you run the program with the changes mentioned it won't sound particularly different from what you heard before you made the changes. That's because our filter mode is LOW PASS, and the cutoff is almost at maximum, therefore letting almost all the sound through, since almost all will have frequencies lower than the cutoff. If we change the value of the cutoff in line 600 from 2000 to, say, 1200 and run the program again, you should definitely be able to hear a difference. The sound seems muffled. This is because the filter has removed a lot of the high frequency parts (harmonics) of the sound. (Note: in between the two values used for cutoff here, you may have noticed that a *good* piano sound could be made. Experiment!)

If we now change the +16 to +64 in line 540 so that we select HIGH PASS filter mode instead and run the program again, we will hear that the "lows" have gone from the sound, because only those frequencies higher than the cutoff are getting through without being quieted. Now change the cutoff in line 600 to 1800 and run the program again and you'll hear that we've REALLY chopped out any low harmonics, and it sounds more like a harpsichord.

Try changing the OCT (octave) variable (between 1 and 6) and the WAVE (waveform) variable (one of 16, 32, 64, 128) in line 510 and you should begin to see that the filter is probably *the* feature which makes the SID surpass *any* sound chip around.

If you really want to get adventurous, you might be able to work out how to change the cutoff dynamically (while the notes are being played) to really produce some interesting effects (like guitar "twangs" for example).

Next time we'll be going from this "playing" program to one where we can put a tune into the program in DATA statements and thus have the computer play FOR us!

The *Commodore 64 Programmer's Reference Guide* gives a lot of information on the SID and programming it (as well as another 400 pages on loads of other interesting aspects), so I advise you to get a copy.

Good luck! **C**

Program from Part 3

Use this program as a reference for Paul's changes here in Part 4.

```
100 FR=3520 :REM NOTE 'A' IN
    TOP OCTAVE
110 CO=2^(1/12)
120 FOR I=1 TO 9:FR=FR/CO:NEXT
130 SS=16777216
140 CS=1022730
150 FC=SS/CS
200 DIM F(7,11)
300 FOR I=0 TO 11
310 S=FR*FC
400 FOR J=7 TO 0 STEP-1
    :F(J,I)=S:S=S/2
410 NEXT
420 FR=FR*CO
430 NEXT
500 SID=54272
510 VOICE=0:OCT=4:WAVE=32
520 VM=7:HI=256
530 FOR I=0 TO 23:POKE SID+I,0
    :NEXT
540 POKE SID+24,15
550 READ A,D,S,R,PW
560 FOR I=0 TO 2:INDEX=SID+I*
    VM
570 POKE INDEX+5,A*16+D
580 POKE INDEX+6,S*16+R
585 POKE INDEX+2,PW AND 255
590 NEXT
600 DATA 5,11,10,0,800
686 POKE INDEX+3,PW/HI
700 K$="Q2W3ER5T6Y7UI9O0P@-*
    [POUND]^"
710 DIM K(255)
720 FOR I=1 TO LEN(K$)
730 K(ASC(MID$(K$,I,1)))=I
740 NEXT
750 PRINT:PRINT"[SPACE]2
    [SPACE]3[SPACE2]5[SPACE]6
    [SPACE]7[SPACE2]9[SPACE]0
    [SPACE2]-[SPACE,POUND]"
760 PRINT"Q[SPACE]W[SPACE]E
    [SPACE]R[SPACE]T[SPACE]Y
    [SPACE]U[SPACE]I[SPACE]O
    [SPACE]P[SPACE]@[SPACE]*
    [SPACE]^"
800 GET A$:IF A$=""GOTO 800
810 KEY=K(ASC(A$))-1
    :IF KEY<0 GOTO 800
820 IF KEY>11 THEN FRQ=F(OCT+
    1,KEY-12):GOTO 835
830 FRQ=F(OCT,KEY)
835 FH=INT(FRQ/HI)
    :FL=FRQ-FH*HI
840 INDEX=SID+VOICE*VM
850 POKE INDEX,FL:POKE INDEX+
    1,FH
860 POKE INDEX+4,WAVE
    :POKE INDEX+4,WAVE+1
870 VOICE=VOICE+1:IF VOICE>2
    THEN VOICE=0
880 GOTO 800
```

no more pencils, no more books

Interactive LOGO continued

the top part of the screen) you will have little or no gravitational pull. As you get closer to the planet LOGO's surface, gravity will become very strong and you will have to keep your rockets blasting away from the planet in order not to be sucked down to a fiery and inglorious end. C

LOGO Lander For Use With The Commodore 64 and LOGO.

```
TO LANDER
   MAKE "HISCORE ( -10000 )
   TITLE
   START
END


TO TITLE
   CLEARTEXT CURSOR 15 0 PRINT [LOGO LANDER]
   CURSOR 12 2 PRINT [BY DAVID MALMBERG]
   CURSOR 0 5 PRINT [TRY TO LAND YOUR COMMAND MODULE ON THE]
   PRINT [PLANT LOGO WITHOUT CRASHING!!!]
   PRINT []
   PRINT [USE THE FOLLOWING CONTROL KEYS:]
   PRINT []
   CURSOR 5 10 PRINT [R - TO ROTATE MODULE RIGHT]
   CURSOR 5 11 PRINT [L - TO ROTATE MODULE LEFT]
   CURSOR 5 12 PRINT [A - TO BLAST MODULE TOWARD LEFT]
   CURSOR 5 13 PRINT [S - TO BLAST MODULE FORWARD]
   CURSOR 5 14 PRINT [D - TO BLAST MODULE TOWARD RIGHT]
   CURSOR 5 15 PRINT [0 TO 9 TO CHANGE BLAST FORCE]
   PRINT []
   PRINT [ENTER SKILL LEVEL: 1 - EASY]
   CURSOR 19 18 PRINT [2 - AVERAGE]
   CURSOR 19 19 PRINT [3 - HARD]
   MAKE "HARD FIRST REQUEST
   IF :HARD = 1 MAKE "HARD 3 STOP
   IF :HARD = 3 MAKE "HARD 1 STOP
   MAKE "HARD 2
END


TO START
   SET.UP
   MOVE :TIME
END
```

```
TO SET.UP
   FULLSCREEN
   PENUP
   SETXY ( -155 ) ( -120 )
   SETHEADING 90
   PENDOWN
   FORWARD 310
   SETX 0
   SETY ( -126 )
   PENUP
   MAKE "FORCE 1
   MAKE "VX 1
   MAKE "VY ( -1 )
   SETHEADING 150
   MAKE "TIME 0
   MAKE "GFACTOR 0.4 + ( ( 3 - :HARD ) / 10 )
   SETXY ( -150 ) 120
END

TO MOVE :TIME
   MAKE "GF ( YCOR / 100 ) - 1.25
   MAKE "GRAVITY GFACTOR * GF * GF
   MAKE "VY :VY - :GRAVITY
   MAKE "NEW.X XCOR + :VX
   MAKE "NEW.Y YCOR + :VY
   LAND?
   SETXY :NEW.X :NEW.Y
   BOUNCE?
   COMMAND
   MOVE :TIME + 1
END


TO LAND?
   IF :NEW.Y > ( -120 ) STOP
   SETY ( -120 )
   MAKE "SPEED SQRT ( ( :VX * :VX ) + ( :VY * :VY ) )
   TEST ANYOF ( :SPEED > 3 * :HARD ) ( :VY < -2 * :HARD )
   IFTRUE EXPLOSION
   WAIT 200
   MAKE "MILES SQRT ( XCOR * XCOR )
   MAKE "SCORE INTEGER 10 * ( 200 - :SPEED + :VY - ( :TIME/ 5 )- 2 *
:MILES )
   NODRAW
   IFTRUE PRINT [YOU CRASHED IN FLAMES!!!] MAKE "SCORE:SCORE - 1000
   IFFALSE PRINT [GOOD LANDING!!!]
   CLEARINPUT
   PRINT []
   PRINT1 [MILES FROM TARGET =] PRINT :MILES
   PRINT1 [IMPACT VELOCITY =] PRINT :SPEED
   PRINT1 [VERTICAL SPEED =] PRINT :VY
   PRINT1 [FLIGHT TIME =] PRINT :TIME
   PRINT []
   PRINT1 [SCORE =] PRINT :SCORE
   IF :HISCORE < :SCORE PRINT[A NEW HIGH SCORE!!]MAKE"HISCORE:SCORE
   PRINT []
   PRINT [HIT RETURN TO PLAY AGAIN]
   CLEARINPUT
   MAKE "ANSWER REQUEST
   IF :ANSWER = [] START STOP
   TOPLEVEL
END


TO EXPLOSION
   HIDETURTLE
   PENCOLOR 2
   PENDOWN
   SETHEADING 240
   REPEAT 9 [FORWARD 15 BACK 15 RIGHT 30]
END


TO WAIT :Q
   IF :Q = 0 STOP
   WAIT :Q - 1
END


TO BOUNCE?
   IF XCOR >150 MAKE "VX ( - :VX ) STOP
   IF XCOR <-150 MAKE "VX ( - :VX ) STOP
   IF YCOR >125 MAKE "VY ( - :VY )
END


TO COMMAND
   MAKE "KEY GET.KEY
   CLEARINPUT
   IF :KEY = " STOP
   IF :KEY = "R RIGHT 30 STOP
   IF :KEY = "L LEFT 30 STOP
   IF :KEY = "A MAKE "ANGLE 270 THRUST STOP
   IF :KEY = "S MAKE "ANGLE 0 THRUST STOP
   IF :KEY = "D MAKE "ANGLE 90 THRUST STOP
   TEST NUMBER? :KEY
   IFFALSE STOP
   MAKE "FORCE :KEY
END


TO GET.KEY
   IF RC? OUTPUT READCHARACTER
   OUTPUT "
END

TO THRUST
   MAKE "BLAST :ANGLE + HEADING
   IF :BLAST > 360 MAKE "BLAST :BLAST - 360
   MAKE "VX :VX + :FORCE * ( SIN :BLAST )
   MAKE "VY :VY + :FORCE * ( COS :BLAST )
END
```

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A Note from New Mexico

by Betsy Byrne

Kids in Nova Scotia and kids in Florida use their Commodore computers for exactly the same kinds of things. How did I come by this amazing bit of information, and why am I telling you? It seems like a good way to begin talking about the overwhelmingly positive response to Kids' Corner I have been receiving from Commodore users all over the continent. I have to admit that I did fudge a little, and send out a letter describing what I was doing with the kids section to all the Commodore user groups. I even included a nifty questionnaire, so I could get an accurate picture of YOU, my readers, and so I could be sure that the things I put in are the things that kids actually *want* in a section for kids.

A big reason I decided to do this was because the time between writing these articles and their publication (known as lead time) can be several months, and I just couldn't wait to tell everybody the good news about Kids' Corner. I also wanted to get all those keyboards clicking out there, generating some good articles and programs for you to read and try out. And it really worked—I've received some great articles and programs from kids in Commodore user groups, as you will see as you read further in this issue.

The answers I received to my questionnaires have been a big help in planning this issue. I want to thank all of you who took the time and effort to fill them out and send them back. I also thank all the user groups that published the letter and the form in their newsletters. If any kids (or adults) that are reading this have not yet contacted the group in their area, I would like to suggest that you do so. There is no better way to get information about using your Commodore computer.

Now I would like to share with you some of the mail I have been getting. After reading some of these I think you will understand why the trip to the mailbox has become one of the high points in my day!

From **Andrew Cornwall:** (Andy is the secretary of the Nova Scotia Commodore Computer Users Group)

"One observation I have from watching my son and his friends working with his VIC (Dad has a PET) is that kids with less than high-school education can often program quite well but don't know what to program. Perhaps it would be interesting for these kids to learn of the science projects and other non-game applications that their contemporaries have undertaken. Good luck on your magazine articles." (I think the story about the ISE Fair winners might just fit the bill!)

The next few comments are taken from some of the questionnaires. In answer to the question: "What hints or suggestions do you have for other kids using Commodore computers", I heard from:

Vince Mora, 16, Albuquerque, New Mexico.... "Don't play games —do your own programming."

Debbie Johnson, 12, Iowa— "Get the games so you don't have to worry about programming to play."

Both these answers were pretty popular, reflecting, I think, that programmers and users are running neck-and-neck in the general computer-owning population. This may sound like heresy, but it is becoming perfectly all right to use your computer to run all the great software that is now available. Let's face it, everyone isn't interested in learning programming in order to use their home computer. After taking a programming class and many hours of instruction from my patient husband, much of my computing time is still spent word processing and teaching kids *about* computers. Let me know what YOU think about the great "Programmer versus User" debate!

Then again, the same **Debbie Johnson** from Iowa had an answer that would seem to put her in the programmer's corner. In answer to "What would you like to do with your computer, but can't", Debbie answered: "Program a really fun (and hard) game"! (Her reason for not being able to do this was "I don't know how yet", so maybe it's just a matter of time!)

kids' corner

Lisa Pomeranz, age 8.6, from New York replied to the same question. Lisa says: "I would like to make the computer talk!" (You may be able to do that sooner than you think, Lisa. I say this with authority, because my Commodore 64 already does! There is an article elsewhere in this issue that will tell you about my family's experiences with Commodore's new speech module.)

Robbie Bowlby, Eastern Passage, Nova Scotia, would like to be able to write machine language. His suggestion to other users is one that we all might take heed of: "Don't leave discs in the drive when turning it on (or off)" (Robbie, there is a new book out that my husband Dan and I recommend to anyone who is finding ML "impossible" or "incomprehensible". The name of it is *Machine Language for Beginners* and it was easy enough even for ME! See the review in this issue.)

A surprisingly large number of parents and teachers, when asked what they would *like* their kids to be using the computer for (as opposed to what they *are* using it for) answered that their kids are already using the computer exactly as they would wish. It's encouraging to me that kids and parents (and even teachers) agree on my favorite subject!

One last item, that I just couldn't resist sharing with you. The following paragraph is an excerpt from the newsletter of the Commodore Users Group of Wichita (Kansas), Inc. and was written by Walt Lounsbery, Editor and General Manager:

"The children's section for *Power/Play* Magazine is a great step forward in concept, and I think it deserves any support you can give it. I know that some other magazines have similar departments, and there even used to be a computer magazine for kids published in Sedalia, Missouri. However I think that Ms. Byrne's approach is fresh, enthusiastic, and imaginative."

I swear to you that I have never even MET this perceptive man, but he did more than just brighten my day with that paragraph. He (and the rest of my new computer correspondents) let me know that this section is something that people—kids AND parents—really want to read. And there was nothing in the world that I wanted to read more than that. **C**

Betsy

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How to Submit Things to Kids' Corner

What To Send

Any Commodore Kid whose submission is published will receive the Commodore-made software product of their choice. Adults will be paid the normal rate per page that any other author gets from Commodore. So, we can all have fun talking about our favorite subject, show off some of the great programs and ideas I know *are out there, and get paid for it in the bargain!*

Here are some suggestions on the kinds of stuff you might like to send in:

From Kids

Programs and articles *by you* on any computing subject. For instance, a really neat game you wrote just for fun, or a program you made to help with your schoolwork or your favorite hobby. A review of one of Commodore's new games or other Commodore software. After all, this is your place to sound off about your likes and dislikes. A story that you write yourself about computers, or some computer poetry, written by either you or your computer might be fun to try. Cartoons, drawings or unusual photos with computers in them are also good to send.

From Grownups

Programs and articles by parents, grandparents, or teachers who use Commodore computers with children, such as:

a. Programs written for very young children (1-6).
b. Articles about your child and her/his computer.
c. Letters to the editor about children and computers.
d. Reviews of software for children.
e. Articles about Commodore computers being used in schools.
f. Interesting or unusual pictures of kids and computers.

How to Send Stuff

Programs: *Must* be sent on disk or tape, clearly marked with computer type and your name, address, and PHONE NUMBER. If your program is for the VIC, mark the label with the amount of memory you had plugged in when you saved the program. Send a printout (listing) if you can, and BE SURE that your disk or tape is mailed in a PADDED protective envelope. Tapes should be in a mailing case, disks between two pieces of stiff cardboard. Just last week I found a broken, melted tape in my mailbox, mailed without protection in a regular envelope. Protective envelopes are found at office supply stores for around 25 cents. They're worth it!

Articles, Stories, Poems, etc.: Should be typed or computer printed, double spaced, each page numbered, and headed with the title and author's name, address, and phone number. I can, if absolutely necessary, accept text that is neatly hand printed on every other line, each page numbered and headed as described above.

Photographs: Color or black and white, preferably 35mm. Taped or otherwise attached to a stiff piece of paper or cardboard (but make sure they can be removed without damaging them). Label the paper with some type of

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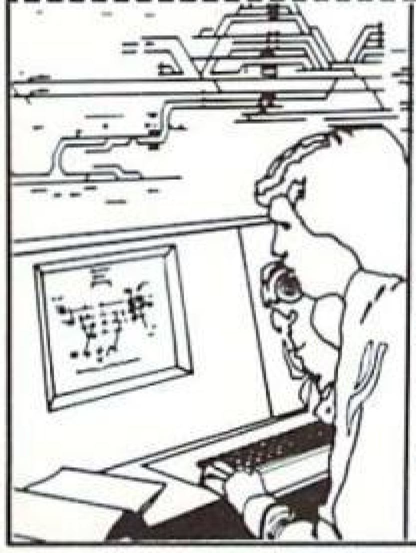

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kids' corner

caption, the name(s) of the person(s) pictured, and the name, address, and phone number of the sender. (School pictures are just fine.)

Drawings: Black and white might be best; at least outline things in a dark color if you can. Make them big enough that details will show if they have to be reduced. If you are sending a cartoon, print the captions in the balloons very carefully, or get someone who is really good at printing to do the words for you. Mail them using the same directions as for photographs.

If you are sending a program, don't forget to include the directions! It's a good idea to have them right in the program if you can. Be sure to keep a copy of everything you send. I might need to call you about it, and unfortunately, I can't send anything back. If you have already sent something in and didn't see it in this issue, remember that we have to get *Power/Play* ready for printing almost THREE months before you read it! If something you sent is going to be in the magazine, you will probably get a phone call from me before you see it in print so don't forget to include your AREA CODE and phone number.

Even if you are sending a drawing, photo or program, write something that tells a little bit about YOU. Don't forget to send a picture of yourself!

The address to send things to is:

COMMODORE KIDS
c/o BETSY BYRNE
6212 KARLSON NE
ALBUQUERQUE NM 87113 **C**

VIC 20 Drawing Contest!

Power/Play's kids' section is having a contest! Not the programming contest that you might expect from one of Commodore's magazines; instead, we're having a VIC 20 computer drawing contest that everyone can enter. Even if you don't know how to program or aren't reading too well yet, you can enter this contest. All you need is a VIC and a program called *Alpha Draw*—a drawing program for the VIC 20.

Alpha Draw is included in Commodore's *Sampler Six Pack,* along with a music program, two adventure games and two action games. Using *Alpha Draw* you can draw on the screen with any of the numbers, letters, characters or right and left side Commodore graphic shapes, and save to tape the beautiful pictures that you make.

But that's not all! The VIC 20 has a built-in feature called multi-color that will make ordinary, everyday characters and shapes look very different. When you press the "J" key in *Alpha Draw* to put the VIC in multi-color mode, magic things begin to happen. An ordinary "X" can become a creepy-crawly spider, and the "<shifted> X" (or club sign, like the playing card suit) makes beautiful flowers, or blossoms on a tree or bush.

There are shapes that look like bricks and others that look like jet planes and racing cars. Explore different color (screen color makes a difference) and character combinations and make a brick building complete with doors, windows and a flag flying from the roof (a flag can be made from four characters, one that looks like a lot of stars, and a striped one repeated three times). You can use the reverse "R" key to make a drawing right out of the movie "TRON". The only limit to *Alpha Draw* pictures and designs is your imagination!

After you make your picture with *Alpha Draw,* save it on a blank tape and send it to Commodore Kids. (A hint about saving: be sure to have your tape set up and the "play" and "record" buttons pressed before you press "S" to save your screen.) Follow the directions you will find elsewhere in the kids' section on how to send things. *Good luck!* **C**

Contest Rules

1. There will be a prize awarded for the best picture in three age groups:
- Group A: age 7 and under
- Group B: age 8 to 11
- Group C: age 12 to 18

2. You may enter as many times as you like, but each tape must have only ONE picture on each side.

3. Every tape label must be clearly marked with the NAME, AGE, ADDRESS, and AREA CODE and PHONE NUMBER of the entrant, and the title of the entry. Repeat the same information on a separate sheet of paper that you enclose WITH the tape. If you like, let us know a little bit about yourself, and send a picture of YOU.

4. PRIZES: The winner in each age group will receive the Commodore VIC 20 program of your choice and a year's subscription to *Power/Play.*

5. Winners will be announced, with a picture of the winning entry in the Spring 1984 issue of *Power/Play.*

6. All entries become the property of *Power/Play* magazine, and none can be returned. By entering the contest, you give your permission to *Power/Play* to print a screen shot of your picture in the magazine.

Multi-Draw

by Pete Lobl

Although Pete Lobl is a successful businessman and president of the Long Island VIC Enthusiasts (LIVE) user group, he's only 15. Watch for a story on Pete in the Winter issue.

When the Commodore 64 was introduced, it drew comments from knowledgeable computer experts that shook the entire industry. By the time that you read this, there will be lots of quality programs available for the 64. But as I write, there isn't much out there in the way of 64 software, so my attitude is: why wait if I can do it myself? You can too, only don't be discouraged if everything doesn't make sense at first; in time it will all drop into place. This article and the accompanying program focus on what will probably be two of the most exploited hidden powers of the Commodore 64: multi-color bit mapping and split screens using both the interrupts and the raster scan and enable registers.

Multi-draw is a little (not that little!) program that I wrote when there wasn't a commercially available drawing program. (As of this writing there are some very well done programs on the market.) In any event, my program allows you to draw in 16 colors on a color page (located at 8192 decimal, $2000 hex). It uses keys or joystick to move the crosshair or brush.

Multi-Color Plotting

Multi-color bit-map mode allows you to display four different colors in an eight dot by eight dot area of the screen. In normal or standard bit-map mode the horizontal resolution is 320 dots by 200 dots. In multi-color bit mapping horizontal resolution is decreased to 160 dots per line (or 160 by 200); but, because of the greater flexibility in color combinations, the loss in resolution is not a severe problem or handicap.

Bit mapping uses an 8K section of memory to store each dot of the screen display (320 by 200 equals 64,000 dots). Multi-color also needs an 8K section of memory. You select colors in this mode from four different locations. The following chart explains:

COLOR#	BIT PAIR	Where Color Comes From (Decimal, Hex)
0	00	Background Color (53281, $D021)
1	01	Low four bits of screen RAM (1024-2048,$0400-$0700)
2	10	Upper four bits screen RAM (1024-2048,$0400-$0700)
2	11	Color Memory (55296-56296, $D800-$DA00)

In hi-res bit mapping, in order to plot a point, you must first find the correct byte in your 8K map and turn the right bit ON by storing a one there. In multi-color mode things get more complex. To receive the different colors, the dots are now replaced by 12-bit-wide dots. With two bits across, the dot can have one of four possible combinations, hence the four different colors. Because the dots are now twice as wide, the decrease in resolution should be more understandable. This excellent color output explains why multi-color mode has been the choice of machine language programmers when using hi-res graphics. The reason I say machine language is because plotting or drawing in hi-res is much too slow if done completely from BASIC. The combination of both BASIC and machine language can make a powerful program for games or plotting. As a matter of fact that's exactly what Multi-Draw is; a hybrid machine code/BASIC program.

Multi-Draw is a little (not that little!) program that I wrote when there wasn't a commercially available drawing program. (As of this writing there are some very well done programs on the market.) In any event, my program allows you to draw in 16 colors on a color page (located at 8192 decimal, $2000 hex). It uses keys or joystick to move the crosshair or brush.

There are several machine code routines POKEd into memory from BASIC using READ and DATA statements. They are called with a SYS command while the program is running. Following is a list of the routines I have used, and also a list of commands for the program. You can receive the disassembly of the routines from me by sending a self-addressed stamped letter to the address at the end of this article.

ML Routines and Their Locations in Memory

CALL PLOT	864
PLOT 3 (plot in color 3)	2048
PLOT 2 (plot in color 2)	2304
PLOT 1 (plot in color 1)	2560
PLOT 0 (erase)	2816
CLR SCREEN	3072
REVERSE SCREEN	3200
FILL A CERTAIN COLOR #	3328
READ JOYSTICK	3584
SET UP INTERRUPT	3712
RASTER SCAN INTERRUPT (split-screen)	3840

Sprite data is mixed in with these routines above their ending locations. There is also a self-modifying SAVE routine in machine code at 5376. The cassette buffer was moved to 4096 ($1000) because my routines exist in the cassette buffer. Therefore loads or saves to tape would wipe them out. This is simply done by changing pointers at 178-179 decimal. The buffer can be moved anywhere in RAM, and allows us to make auto-run tape loads.

List of Multi-Draw Commands

<−>	Toggles between joystick/key
</>	Toggles fast/slow crosshair
<P>	Picks up pen (move mode) or puts it down (draw mode)
<ˆ,*>	Inc/dec text background color
<R>	Reverses screen
<Q>	Changes cursor increment between points (enter 1-9 for input)
<shift>	Decrements cursor color
<F1>	Color 1
<F3>	Color 2
<F5>	Color 3
<:,D>	Inc/dec current drawing color
<F7/F8>	Inc/dec background
<HOME>	Clears screen
<+>	Toggles crosshair on/off
<F>	Fills a specified color # (1,2,3) with a color value (0-15)
<E>	Erase mode (color 0) (use F1,F3,F5 to go back to normal)

Program Listing

****IMPORTANT*** Before running the program you must enter a line directly into your computer from the immediate mode:

```
POKE 44,64:POKE 64*256,0:NEW
     <return>
```

Do this before loading or running this program. All it does is move BASIC up in memory to allow room for the machine code and hi-res screen. The program won't work without it, so don't forget.

Program Notes

SAVE & LOAD: The save and load routine I use is a bit unorthodox. I save three files onto tape/disk for each screen: 1 for RAM, 1 for bit map, 1 for color RAM. After entering the file name in the save/load subroutines, the program searches for three programs on that device, even though you entered only one file name. What happened was that I added a 1, then 2, then 3 as the rightmost character during the save. This makes the save somewhat faster, taking only about 20 seconds to load a screen from disk. (Tape of course will be longer.) Don't add the numbers when asked for a file name; the program does it for you. The only penalty that occurs because of this is that the filename can only be 15 characters instead of the normal 16.

Raster Scan: Multi-draw has a window at the bottom of the screen in which normal characters can be displayed. This effect is possible because of the raster-scan interrupt, a complex but powerful ability of the 64. The location that controls where the window will start is at 3846. Break out of the program by pressing the stop key, and try POKing different values into that location (0-255). You will notice that the window will get larger with smaller numbers POKEd in. The technique that allows this will also make it possible to have more than eight sprites on the screen at once or multi-color and standard color at the same time. You could even bit-map the entire screen with sprites!! **C**

To get a copy of Multi-Draw on disk, send $5.00 and a stamped, self-addressed return mailer to Pete at: 31 Maple Drive, Lindenhurst, NY 11757.

Multi-Draw

```
0 REM MANY THANKS TO MRS. BYRNE WHO GAVE ME A CHANCE TO W
  RITE THIS.
1 REM MANY REGARDS ALSO TO MR. JIM BUTTERFIELD WHO FIXED
  MY SPLIT-SCREEN.
2 REM ******************************************************
  ************************
3 REM MAKE SURE YOU RAISED BASIC BY TYPING  POKE44,64
  :POKE64*256,0:NEW
4 REM BEFORE ENTERING OR LOADING THIS !!*****************
  ************************
5 ON A GOTO 981,982,983
6 IF PEEK(44)<>64 THEN PRINT"[CLEAR,DOWN]BASIC[SPACE]HAS
  [SPACE]NOT[SPACE]BEEN[SPACE]MOVED.[SPACE]RESTART[SPACE]
  !!!":LIST 2-4
7 POKE 3846,226:POKE 53281,6:POKE 53280,14:POKE 178,0
  :POKE 179,16:PRINT"[L. BLUE]"
10 PRINT"[CLEAR,DOWN3,SPACE13]MULTI-DRAW[SPACE]64"
15 PRINT"[DOWN,SPACE13]BY:[SPACE]PETE[SPACE]LOBL"
16 PRINT"[DOWN,SPACE12]VERSION[SPACE]5/31/83"
20 PRINT"[DOWN5]PLEASE[SPACE]WAIT,[SPACE]READING[SPACE]IN
   [SPACE]MACHINE[SPACE]CODE..."
30 DIM C$(15),CH%(11):P$="[HOME]":FOR I=1 TO 22
   :P$=P$+"[DOWN]":NEXT:FOR I=0 TO 15:READ C$(I):NEXT
40 FOR I=1 TO 10:READ X%(I),Y%(I):NEXT
50 C1=6:C2=2:C3=1:CC=1:K$="JOY":K=0:P=1:PE$="DOW":TB=14
   :MB=15:X=64:Y=88:CE=6
```

```
60 PE=1:MV=1:FS$="FAS":FS=1:PL=864:CL=3072:RV=3200:FL=3328
   :RJ=3584:IN=3712
65 POKE 2040,35:POKE 2041,39:POKE 2042,43:POKE 2043,47
   :POKE 53277,15:POKE 53271,4
67 FOR I=53287 TO 53291:POKE I,1:NEXT:POKE 53264,7:CX=828
   :CY=829
68 FOR I=53248 TO 53252 STEP 2:POKE I,32:NEXT
69 POKE 53251,128:POKE 53249,104:POKE 53253,170
70 GOSUB 1000: REM READ IN ML
80 FOR I=1 TO 63:READ A:POKE 2240+I,A:NEXT:POKE 2240,99
82 FOR I=0 TO 63:READ A:POKE 2496+I,A:NEXT
84 FOR I=0 TO 63:READ A:POKE 2752+I,A:NEXT
86 FOR I=0 TO 63:READ A:POKE 3008+I,A:NEXT
88 FOR I=0 TO 35:READ A:POKE 4608+I,A:NEXT
90 YC=53255:XC=53254:X1=6:Y1=43
92 POKE XC,X*2+X1:POKE YC,Y+Y1:SYS IN:POKE 53274,241
   :POKE 56334,0:SYS CL
93 POKE 689,TB:POKE 704,MB:POKE 53269,15:PRINT P$"[BLUE]"
   :GOSUB 990:GOSUB 840:POKE 53280,C1
94 POKE 848,CC:POKE 849,C1:POKE 850,C2:POKE 851,C3
   :POKE 53269,7
96 FOR I=0 TO 175:POKE CY,I:POKE CX,0:SYS PL:POKE CX,124
   :SYS PL:NEXT
98 FOR I=0 TO 124:POKE CX,I:POKE CY,0:SYS PL:POKE CX,I
   :POKE CY,175:SYS PL:NEXT
99 POKE 53269,15:POKE 198,0:H=124:HY=175
100 IF K THEN 120
105 POKE 650,.:SYS RJ:A=PEEK(679):IF A=.THEN 120
107 Q=X%(A)*MV+X:R=Y%(A)*MV+Y:IF Q>H THEN Q=Q-H-1:GOTO 109
108 IF Q<.THEN Q=H+Q+1
109 IF R>HY THEN R=R-HY-1:GOTO 111
110 IF R<.THEN R=HY+R+1
111 X=Q:Y=R:POKE CX,X:POKE CY,Y:IF PE THEN SYS PL
112 IF FS=0 THEN GOSUB 850
113 POKE XC,X*2+X1:POKE YC,Y+Y1:GOTO 100
120 GET A$:IF A$=""THEN 100
121 IF K=0 THEN 138
122 POKE 650,128:IF A$<>"I"THEN 124
123 A=2:GOTO 107
124 IF A$<>"U"THEN 126
125 A=8:GOTO 107
126 IF A$<>"J"THEN 128
127 A=6:GOTO 107
128 IF A$<>"N"THEN 130
```

```
129 A=10:GOTO 107
130 IF A$<>"M"THEN 132
131 A=4:GOTO 107
132 IF A$<>","THEN 134
133 A=7:GOTO 107
134 IF A$<>"K"THEN 136
135 A=3:GOTO 107
136 IF A$<>"O"THEN 138
137 A=5:GOTO 107
138 POKE 198,0:IF A$<>"-"THEN 141
139 IF K THEN K=0:K$="JOY":GOSUB 990:GOSUB 840:GOTO 100
140 K=1:K$="KEY":GOSUB 990:GOSUB 840:GOTO 100
141 IF A$<>"E"THEN 143
142 CC=0:POKE 848,0:GOSUB 990:GOSUB 840:GOTO 100
143 IF A$="R"THEN SYS RV:GOTO 100
145 IF A$="[F7]"THEN A=PEEK(704):A=(A+1)*-(A<15)
    :POKE 704,A:GOTO 100
146 IF A$="[F8]"THEN A=PEEK(704):A=A-1
    :A=A+((SGN(A)=-1)*(-16)):POKE 704,A:GOTO 100
147 IF A$="^"THEN A=PEEK(689):A=(A+1)*-(A<15):POKE 689,A
    :GOTO 100
148 IF A$="*"THEN A=PEEK(689):A=A-1
    :A=A+((SGN(A)=-1)*(-16)):POKE 689,A:GOTO 100
149 IF A$="/"THEN A=PEEK(53290):A=(A+1)*-(A<255)
    :POKE 53290,A:GOTO 100
150 IF A$="?"THEN A=PEEK(53290):A=A-1
    :A=A+((SGN(A)=-1)*(-256)):POKE 53290,A:GOTO 100
153 IF A$<>"[POUND]"THEN 156
154 IF FS THEN FS=0:FS$="SLO":GOTO 180
155 FS=1:FS$="FAS":GOTO 180
156 IF A$<>"+"THEN 159
157 IF PEEK(53269)=15 THEN POKE 53269,7:GOTO 100
158 POKE 53269,15:GOTO 100
159 IF A$<>"P"THEN 162
160 IF PE THEN PE=0:PE$="UP[SPACE]":GOSUB 990:GOSUB 840
    :GOTO 100
161 PE=1:PE$="DOW":GOSUB 990:GOSUB 840:GOTO 100
162 IF A$<>"[HOME]"THEN 164
163 SYS CL:GOSUB 990:GOSUB 840:GOTO 90
164 IF A$<>"L"THEN 166
165 GOSUB 950:GOSUB 990:GOSUB 840:GOTO 100
166 IF A$<>"S"THEN 168
167 GOSUB 900:GOSUB 990:PRINT P$"[DOWN2,UP2]":GOSUB 840
    :GOTO 100
```

```
168 IF A$<>"M"THEN 170
169 GOSUB 182:POKE 53269,0:GOSUB 860:GOSUB 870
    :POKE 3846,226:POKE 53269,15:GOTO 184
170 IF A$<>"X"THEN 200
171 POKE 53269,0:GOSUB 860:PRINT"[CLEAR,DOWN]I[SPACE]HOPE
    [SPACE]YOU[SPACE]HAD[SPACE]FUN,[SPACE]SEE[SPACE]YA'
    [SPACE]NEXT[SPACE]TIME"
172 PRINT"[DOWN]OH,[SPACE]WHY[SPACE]DON'T[SPACE]YOU[SPACE]
    EXPERIMENT[SPACE]WITH"
173 PRINT"[DOWN]LOCATION[SPACE]3846.[SPACE]POKE[SPACE]
    DIFFERENT[SPACE]NUMBERS"
174 PRINT"[DOWN]THERE.[SPACE2]YOU[SPACE]MAY[SPACE]NOT
    [SPACE]KNOW[SPACE]IT,[SPACE]BUT[SPACE]YOU'LL"
175 PRINT"[DOWN]BE[SPACE]CONTROLLING[SPACE]THE[SPACE]
    RASTER[SPACE]INTERRUPT!!!"
176 PRINT"[DOWN3]TILL[SPACE]NEXT[SPACE]TIME,[SPACE]HAVE
    [SPACE]FUN..............":END
180 GOSUB 990:GOSUB 840:GOTO 100
182 PRINT P$"[SPACE,RVS,SPACE12]PLEASE[SPACE]WAIT[SPACE15,
    RVOFF]"P$
183 A=5376:B=1024:C=2023:FOR I=B TO C:POKE A,PEEK(I):A=A+1
    :NEXT:RETURN
184 A=5376:B=1024:C=2023:FOR I=B TO C:POKE I,PEEK(A):A=A+1
    :NEXT:GOSUB 840:GOTO 100
199 REM COMMANDS CONTINUED ****
200 IF A$<>"Q"THEN 204
201 GOSUB 990:PRINT P$:INPUT"[RVS]NEW[SPACE]INCREMENT
    [SPACE]";A$:A=INT(VAL(A$)):IF A<1 THEN A=1
202 IF A>9 THEN A=9
203 MV=A:GOSUB 990:GOSUB 840:GOTO 100
204 IF A$<>":"THEN 209
205 A=CE:A=(A+1)*-(A<15):POKE 848+CC,A:GOSUB 990:CE=A
    :POKE 53280,CE
206 IF CC=2 THEN C2=A:GOSUB 840:GOTO 100
207 IF CC=3 THEN C3=A:GOSUB 840:GOTO 100
208 C1=A:GOSUB 840:GOTO 100
209 IF A$<>"D"THEN 214
210 A=CE:A=A-1:A=A+((SGN(A)=-1)*(-16)):GOSUB 990:CE=A
    :POKE 53280,CE
211 POKE 848+CC,A:IF CC=2 THEN C2=A:GOSUB 840:GOTO 100
212 IF CC=3 THEN C3=A:GOSUB 840:GOTO 100
213 C1=A:GOSUB 840:GOTO 100
214 IF A$<>"[F1]"THEN 216
```

```
215 POKE 848,1:CE=C1:CC=1:POKE 53280,CE:GOSUB 990
    :GOSUB 840:GOTO 100
216 IF A$<>"[F3]"THEN 218
217 POKE 848,2:CE=C2:CC=2:POKE 53280,CE:GOSUB 990
    :GOSUB 840:GOTO 100
218 IF A$<>"[F5]"THEN 220
219 POKE 848,3:CE=C3:CC=3:POKE 53280,CE:GOSUB 990
    :GOSUB 840:GOTO 100
220 IF A$<>"F"THEN 100
221 GOSUB 990:PRINT P$:INPUT"COLOR[SPACE]#[SPACE]";A$
    :A=INT(VAL(A$)):IF A<1 OR A>3 THEN A=1
222 POKE 674,A:GOSUB 990:PRINT P$:INPUT"COLOR[SPACE]VALUE
    [SPACE]";A$:A=INT(VAL(A$))
223 IF A<0 OR A>15 THEN A=0
224 POKE 675,A:SYS FL:GOSUB 990:GOSUB 840:GOTO 100
840 REM PRINT BOTTOM 3 LINES *****
841 GOSUB 990:PRINT P$"[RVS]NUM[RVOFF]"STR$(CC)"[SPACE,
    RVS]COL[RVOFF,SPACE]"C$(CE)"[SPACE,RVS]"K$"[RVOFF,
    SPACE,RVS]INC[RVOFF]"STR$(MV);
842 PRINT"[SPACE,RVS]PEN[RVOFF,SPACE]"PE$"[SPACE,RVS]SPE
    [RVOFF,SPACE]"FS$
843 PRINT"[RVS]COL1[RVOFF,SPACE]"C$(C1)"[SPACE,RVS]COL2
    [RVOFF,SPACE]"C$(C2)"[SPACE,RVS]COL3[RVOFF,SPACE]
    "C$(C3)"[SPACE,RVS]X[RVOFF]"X;
844 PRINT"[RVS]Y[RVOFF]"Y
845 RETURN
850 REM PRINT NEW X AND Y *****
851 PRINT P$"[DOWN]"TAB(27)"[RVS]X[RVOFF,SPACE10,LEFT10]
    "X"[RVS]Y[RVOFF]"Y:RETURN
860 REM MOVE RASTER UP *******
865 POKE 3846,0:RETURN
867 LOC.3846 = LOCATI ON TO START PUTTING    THE N OR MAL
     TEXT AT (Y CO OR DINATE)
870 REM LIST COMMANDS *****
872 PRINT"[CLEAR,SPACE2]U[SPACE2]I[SPACE2]O"
874 PRINT"[SPACE3,SHFT M,SPACE,SHFT -,SPACE,SHFT N]"
876 PRINT"[SPACE2]J[SHIFT *2,SHFT +,SHIFT *2]K[SPACE3]
    KEYS[SPACE]TO[SPACE]MOVE[SPACE]CURSOR"
878 PRINT"[SPACE3,SHFT N,SPACE,SHFT -,SPACE,SHFT M,SPACE4]
    ([SPACE]OR[SPACE]USE[SPACE]JOYSTICK[SPACE])"
880 PRINT"[SPACE2]N[SPACE2]M[SPACE2],"
881 PRINT"[DOWN]P[SPACE]=[SPACE]TOGGLES[SPACE]BETWEEN
    [SPACE]PEN[SPACE]UP[SPACE]AND[SPACE]PEN[SPACE]DOWN"
882 PRINT"F1,F3,F5[SPACE]=[SPACE]CHANGE[SPACE]TO[SPACE]
    COLORS[SPACE]1,2,3"
```

```
883 PRINT":[SPACE]=[SPACE]INCREMENT[SPACE]CURRENT[SPACE]
    COLOR"
884 PRINT"D[SPACE]=[SPACE]DECREMENT[SPACE]CURRENT[SPACE]
    COLOR"
885 PRINT"-[SPACE]=[SPACE]TOGGLES[SPACE]JOYSTICK/KEY
    [SPACE]MOVEMENT"
886 PRINT"S[SPACE]=[SPACE]SAVE[SPACE]SCREEN"
887 PRINT"L[SPACE]=[SPACE]LOAD[SPACE]SCREEN"
888 PRINT"F7,F8[SPACE]=[SPACE]INC/DEC[SPACE]HI-RES[SPACE]
    BACKGROUND[SPACE]COLOR"
889 PRINT"E[SPACE]=[SPACE]CHANGE[SPACE]TO[SPACE]ERASE
    [SPACE]MODE[SPACE](COLOR[SPACE]0)"
890 PRINT"[HOME][SPACE]=[SPACE]CLEARS[SPACE]HI-RES[SPACE]
    SCREEN"
891 PRINT"+[SPACE]=[SPACE]TOGGLES[SPACE]CURSOR[SPACE]
    ON/OFF"
892 PRINT"F[SPACE]=[SPACE]FILLS[SPACE]SCREEN[SPACE]WITH
    [SPACE]A[SPACE]COLOR"
893 PRINT"R[SPACE]=[SPACE]REVERSES[SPACE]SCREEN"
894 PRINT"Q[SPACE]=[SPACE]CHANGE[SPACE]CURSOR[SPACE]
    INCREMENT"
895 PRINT"[POUND,SPACE]=[SPACE]TOGGLE[SPACE]FAST/SLOW
    [SPACE]CURSOR[SPACE]MOVEMENT"
896 PRINT"/,[SHIFT]/[SPACE]=[SPACE]INC/DEC[SPACE]CURSOR
    [SPACE]COLOR"
897 PRINT"^,*[SPACE]=[SPACE]INC/DEC[SPACE]TEXT[SPACE]
    BACKGROUND"
898 PRINT"X[SPACE]=[SPACE]EXITS[SPACE]PROGRAM"
899 PRINT"[RVS]HIT[SPACE]SPACE[SPACE]BAR[SPACE]TO[SPACE]
    RETURN[RVOFF,HOME]":WAIT 197,32,0:RETURN
900 REM SAVE SUB******
902 NA$="":GOSUB 990
905 PRINT P$;:INPUT"[DOWN]NAME[SPACE]OF[SPACE]SCREEN
    [SPACE4,LEFT3]";NA$
910 PRINT P$;:INPUT"[DOWN]TAPE[SPACE]OR[SPACE]DISK[SPACE]
    (T/D)[SPACE9,LEFT8]";DV$
915 IF NA$=""AND DV$="D"THEN RETURN
920 IF LEN(NA$)>15 THEN RETURN
921 GOSUB 990
922 PRINT P$"[SPACE,RVS,SPACE12]PLEASE[SPACE]WAIT[SPACE15,
    RVOFF]"P$
925 POKE 3846,0:IF DV$="T"THEN D=1:GOTO 927
926 D=8
927 POKE 4611,D:POKE 4618,LEN(NA$)+1:A=1:NA$=NA$+"1"
```

```
928 PRINT P$;:FOR I=1 TO LEN(NA$):POKE 4863+I,
    ASC(MID$(NA$,I,1)):NEXT
929 IF A=1 THEN POKE 4627,4:POKE 4631,0:POKE 4639,7
    :POKE 4637,127
931 IF A=2 THEN POKE 4627,32:POKE 4631,0:POKE 4639,62
    :POKE 4637,0
933 IF A=3 THEN POKE 4627,216:POKE 4631,0:POKE 4639,219
    :POKE 4637,127
935 SYS 4608:NA$=LEFT$(NA$,LEN(NA$)-1)
937 A=A+1:IF A=2 THEN NA$=NA$+"2":GOTO 928
939 IF A=3 THEN NA$=NA$+"3":GOTO 928
941 GOSUB 990:PRINT"[HOME]":POKE 3846,226:POKE 56334,0
    :RETURN
950 REM LOAD SUB******
952 NA$="":GOSUB 990
955 PRINT P$;:INPUT"[DOWN]NAME[SPACE]OF[SPACE]SCREEN
    [SPACE4,LEFT3]";NA$
960 PRINT P$;:INPUT"[DOWN]TAPE[SPACE]OR[SPACE]DISK[SPACE]
    (T/D)[SPACE9,LEFT8]";DV$
965 IF NA$=""AND DV$="D"THEN RETURN
970 IF LEN(NA$)>15 THEN RETURN
972 GOSUB 990
975 PRINT P$"[DOWN2,SPACE,RVS,SPACE11]PLEASE[SPACE]WAIT
    [SPACE16,RVOFF]"P$;
976 POKE 3846,0:IF LEFT$(DV$,1)="T"THEN D=1:GOTO 980
977 D=8
980 PRINT P$"[UP]";:NA$=NA$+"1":A=1:LOAD NA$,D,1
981 PRINT P$"[UP]";:A=A+1:NA$=LEFT$(NA$,LEN(NA$)-1)
    :NA$=NA$+"2":LOAD NA$,D,1
982 PRINT P$"[UP]";:A=A+1:NA$=LEFT$(NA$,LEN(NA$)-1)
    :NA$=NA$+"3":LOAD NA$,D,1
983 POKE 3846,226:POKE 56334,0:GOSUB 990:GOSUB 840
    :GOTO 100
990 REM CLEAR TEXT *****
992 FOR I=1904 TO 2023:POKE I,32:NEXT:RETURN
1000 FOR I=1 TO 11:READ CH%(I):NEXT
1010 B=1:T=0
1020 READ A$:TE=VAL(A$):IF A$="E"THEN 1040
1025 IF A$="F"THEN 1050
1030 T=T+TE:GOTO 1020
1040 IF T=CH%(B)THEN B=B+1:T=0:GOTO 1020
1045 PRINT"[DOWN]ERROR[SPACE]IN[SPACE]DATA[SPACE]BLOCK"B
     :END
1050 IF T=CH%(B)THEN 1060
```

```
1055 PRINT"[DOWN]ERROR[SPACE]IN[SPACE]DATA[SPACE]BLOCK"B
     :END
1060 PRINT"[DOWN]DATA[SPACE]CORRECT,[SPACE]NOW[SPACE]
     ENTERING..."
1065 RESTORE:FOR I=1 TO 47:READ A$:NEXT
1070 A=864:B=953:GOSUB 1200:A=2048:B=2200:GOSUB 1200
     :A=2304:B=2468:GOSUB 1200
1080 A=2560:B=2728:GOSUB 1200:A=2816:B=2932:GOSUB 1200
     :A=3072:B=3174:GOSUB 1200
1090 A=3200:B=3237:GOSUB 1200:A=3328:B=3465:GOSUB 1200
     :A=3584:B=3635:GOSUB 1200
1100 A=3712:B=3746:GOSUB 1200:A=3840:B=3920:GOSUB 1200
1150 PRINT"[DOWN]DATA[SPACE]ENTERED[SPACE]!!!":RETURN
1200 FOR I=A TO B:READ T:POKE I,T:NEXT:READ A$:RETURN
2999 REM COLOR TRANSLATE DATA *****
3000 DATA BLK,WHT,RED,CYN,PUR,GRN,BLU,YEL,ORG,BRN,LRD,DGR,
     MGR,LGN,LBL,LGR
3009 REM JOYSTICK ARRAY DATA ******
3010 DATA,,,-1,1,,,1,1,-1,-1,,1,1,-1,-1,,,-1,1
5900 REM CHECKSUMS *****
5910 DATA 10078,18217,19331,19145,13292,10587,4275,12661,
     4922,3396,9730
6000 REM BLOCK 1 *******
6005 DATA 14,60,3,173,66,3,201,1,240,19,162,0,189,170,3,
     157,66,3
6010 DATA 189,178,3,157,84,3,232,224,8,208,239,160,0,132,
     249,169,32
6020 DATA 133,250,173,80,3,240,20,201,3,240,19,132,253,
     162,4,134,254
6030 DATA 201,1,240,3,76,0,9,76,0,10,76,0,11,132,251,169,
     216
6040 DATA 133,252,76,0,8,1,2,4,8,16,32,64,128,254,253,251,
     247
6050 DATA 239,223,191,127,E
6060 REM BLOCK 2 *******
6065 DATA 173,60,3,74,74,74,141,62,3,173,61,3,74,74,74,
     141,63,3
6070 DATA 173,61,3,41,7,141,64,3,173,60,3,41,7,141,65,3,
     169
6080 DATA 7,56,237,65,3,141,65,3,174,63,3,24,240,16,230,
     250,165
6090 DATA 249,105,64,133,249,144,3,230,250,24,202,208,240,
     174,62,3,240
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6100 DATA 14,165,249,105,8,133,249,144,3,230,250,24,202,
     208,242,165,249
6110 DATA 109,64,3,133,249,144,3,230,250,24,174,65,3,160,
     0,189,66
6120 DATA 3,17,249,145,249,202,189,66,3,17,249,145,249,
     174,63,3,24
6130 DATA 240,14,165,251,105,40,133,251,144,3,230,252,24,
     202,208,242,165
6140 DATA 251,109,62,3,133,251,144,2,230,252,173,83,3,145,
     251,96,E
6150 REM BLOCK 3 *******
6155 DATA 173,60,3,74,74,74,141,62,3,173,61,3,74,74,74,
     141,63,3
6160 DATA 173,61,3,41,7,141,64,3,173,60,3,41,7,141,65,3,
     169
6170 DATA 7,56,237,65,3,141,65,3,174,63,3,24,240,16,230,
     250,165
6180 DATA 249,105,64,133,249,144,3,230,250,24,202,208,240,
     174,62,3,240
6190 DATA 14,165,249,105,8,133,249,144,3,230,250,24,202,
     208,242,165,249
6200 DATA 109,64,3,133,249,144,3,230,250,24,174,65,3,160,
     0,189,66
6210 DATA 3,17,249,145,249,202,189,84,3,49,249,145,249,
     174,63,3,24
6220 DATA 240,14,165,253,105,40,133,253,144,3,230,254,24,
     202,208,242,165
6230 DATA 253,109,62,3,133,253,144,2,230,254,173,82,3,41,
     15,141,62
6240 DATA 3,177,253,41,240,13,62,3,145,253,96,E
6250 REM BLOCK 4 *******
6255 DATA 173,60,3,74,74,74,141,62,3,173,61,3,74,74,74,
     141,63,3
6260 DATA 173,61,3,41,7,141,64,3,173,60,3,41,7,141,65,3,
     169
6270 DATA 7,56,237,65,3,141,65,3,174,63,3,24,240,16,230,
     250,165
6280 DATA 249,105,64,133,249,144,3,230,250,24,202,208,240,
     174,62,3,240
6290 DATA 14,165,249,105,8,133,249,144,3,230,250,24,202,
     208,242,165,249
6300 DATA 109,64,3,133,249,144,3,230,250,24,174,65,3,160,
     0,189,84
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6310 DATA 3,49,249,145,249,202,189,66,3,17,249,145,249,
     174,63,3,24
6320 DATA 240,14,165,253,105,40,133,253,144,3,230,254,24,
     202,208,242,165
6330 DATA 253,109,62,3,133,253,144,2,230,254,173,81,3,41,
     15,10,10
6340 DATA 10,10,141,62,3,177,253,41,15,13,62,3,145,253,96,
     E
6350 REM BLOCK 5 *******
6355 DATA 173,60,3,74,74,74,141,62,3,173,61,3,74,74,74,
     141,63,3
6360 DATA 173,61,3,41,7,141,64,3,173,60,3,41,7,141,65,3,
     169
6370 DATA 7,56,237,65,3,141,65,3,174,63,3,24,240,16,230,
     250,165
6380 DATA 249,105,64,133,249,144,3,230,250,24,202,208,240,
     174,62,3,240
6390 DATA 14,165,249,105,8,133,249,144,3,230,250,24,202,
     208,242,165,249
6400 DATA 109,64,3,133,249,144,3,230,250,24,174,65,3,160,
     0,189,84
6410 DATA 3,49,249,145,249,202,189,84,3,49,249,145,249,96,
     E
6420 REM BLOCK 6 *******
6425 DATA 160,0,162,32,142,67,12,232,142,70,12,232,142,73,
     12,232,142,76
6430 DATA 12,173,33,208,10,10,10,10,141,176,2,173,33,208,
     41,15,13
6440 DATA 176,2,153,0,216,153,0,217,153,0,218,153,232,218,
     153,0,4
6450 DATA 153,0,5,153,0,6,153,232,6,200,208,229,152,153,0,
     60,153
6460 DATA 0,61,153,0,62,153,0,63,200,208,241,174,67,12,
     224,60,240
6470 DATA 15,238,67,12,238,70,12,238,73,12,238,76,12,76,
     65,12,96,E
6480 REM BLOCK 7 *******
6485 DATA 160,0,162,32,142,140,12,142,145,12,185,0,32,73,
     255,153,0,32,200
6490 DATA 208,245,173,140,12,201,63,240,9,238,140,12,238,
     145,12,76,138,12,96,E
6540 REM BLOCK 8 *******
6545 DATA 160,0,173,163,2,174,162,2,224,1,240,20,224,2,
     240,71,153
```

```
6550 DATA 0,216,153,0,217,153,0,218,153,0,219,200,208,241,
     96,10,10
6560 DATA 10,10,141,164,2,185,0,4,41,15,13,164,2,153,0,4,
     185,0
6570 DATA 5,41,15,13,164,2,153,0,5,185,0,6,41,15,13,164,2
6580 DATA 153,0,6,185,232,6,41,15,13,164,2,153,232,6,200,
     208
6590 DATA 209,96,141,164,2,185,0,4,41,240,13,164,2,153,0,
     4,185
6600 DATA 0,5,41,240,13,164,2,153,0,5,185,0,6,41,240,13,
     164
6610 DATA 2,153,0,6,185,232,6,41,240,13,164,2,153,232,6,
     200,208,209,96,E
6620 REM BLOCK 9 *******
6625 DATA 169,0,141,167,2,173,0,220,106,176,9,162,2,142,
     167,2,106
6630 DATA 76,28,14,106,176,5,162,4,142,167,2,106,176,9,
     173,167,2
6640 DATA 105,6,141,167,2,96,106,176,8,173,167,2,105,3,
     141,167,2,96,E
6650 REM BLOCK 10 *******
6655 DATA 120,169,15,141,21,3,169,0,141,20,3,141,178,2,
     141,18,208
6660 DATA 173,17,208,41,127,141,17,208,173,25,208,9,1,141,
     25,208,88,96,E
6670 REM BLOCK 11 *******
6675 DATA 173,178,2,208,37,169,226,141,18,208,169,59,141,
     17,208,173,192
6680 DATA 2,141,33,208,169,29,141,24,208,169,24,141,22,
     208,169,1,141
6690 DATA 25,208,141,178,2,76,49,234,169,252,141,18,208,
     169,27,141,17
6700 DATA 208,173,177,2,141,33,208,169,21,141,24,208,169,
     8,141,22,208
6710 DATA 169,1,141,25,208,169,0,141,178,2,76,129,234,F
6999 REM SPRITE DATA ********
7000 DATA 74,250,85,74,34,73,74,34,65,74,34,65,74,34,65,
     123,162
7010 DATA 0,0,0,49,198,68,41,41,68,37,41,68,37,207,84,41,
     41
7020 DATA 84,49,41,40,0,0,0,1,196,0,2,4,128,2,4,128,3
7030 DATA 199,128,2,32,128,1,192,128,0,0,0,0,4,0,0,4,18
7040 DATA 0,7,146,64,4,158,0,7,130,64,0,14,0,0,0,0,61
7050 DATA 239,188,37,2,32,61,194,56,33,2,32,33,226,60,0,8,0
```

```
7060 DATA 33,232,64,33,47,64,33,41,64,61,239,120,0,0,0,0,0
7070 DATA 0,0,0,0,0,0,0,0,37,124,136,37,16,216,61,16,168
7080 DATA 37,16,136,37,16,136,0,0,0,15,123,192,8,74,64,14,
     75
7090 DATA 128,8,74,64,8,122,64,0,0,0,0,0,0,139,232,162,218
7100 DATA 12,162,171,138,162,138,9,162,138,8,162,139,232,
     190,0,0,0
7110 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,64,0,0
7120 DATA 64,0,1,240,0,1,16,0,7,28,0,1,16,0,1,240,0
7130 DATA 0,64,0,0,64,0,0,0,0,0,0,0,0,0,0,0,0
7140 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
7200 REM SAVE ML DATA ******
7210 DATA 169,1,162,8,160,255,32,186,255,169,15,162,0,160,
     19,32,189,255,169
7220 DATA 4,133,253,169,0,133,252,169,252,162,127,160,7,
     32,216,255,96
```

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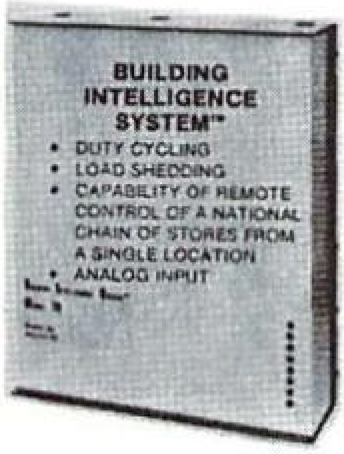
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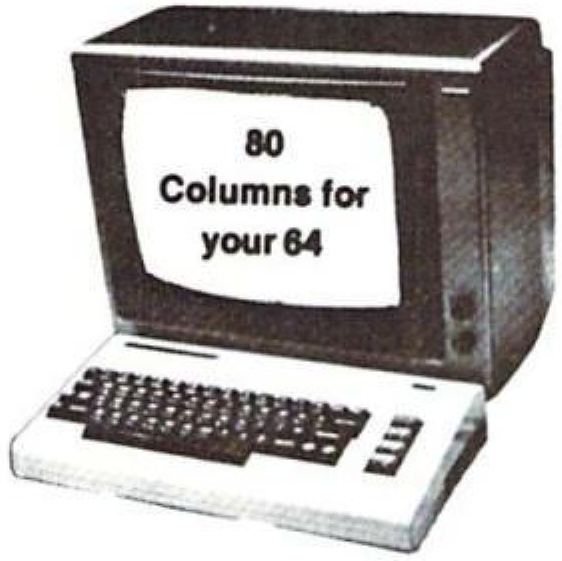

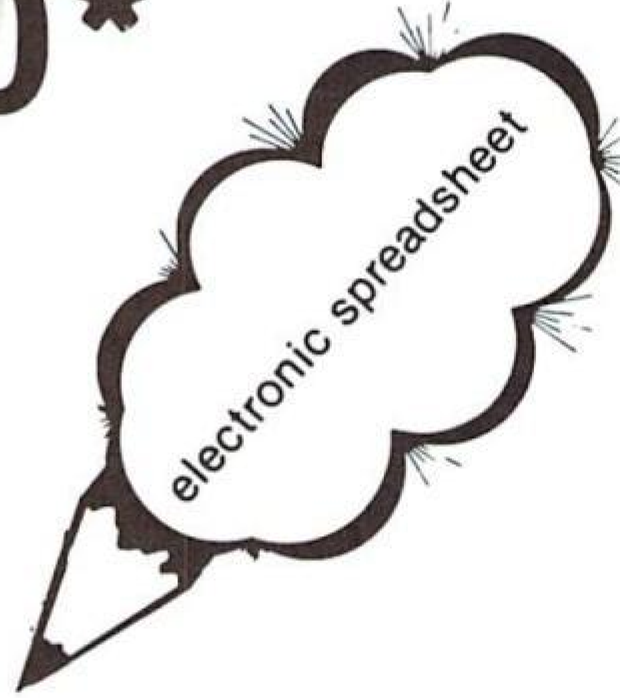

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Commodore Kids Win Awards

by Betsy Byrne

Worried about the future? Not me! I recently attended the 34th International Science and Engineering (ISE) Fair, held in my home town, Albuquerque, New Mexico. Why would a science and engineering exhibition put my fears about the future of the world to rest? Because the exhibitors at this particular fair were kids, students who won the honor of participating there by being the best in ISE fairs all over the USA and several other countries. And in even the short time I had to look around (several hours), I was awed and amazed at the caliber of the projects presented and the bright young minds that had conceived them.

Being a Commodore enthusiast, I was not at all surprised (but I did feel pleased and proud), to see that our favorite computers played a big role in several ambitious and impressive projects. VIC 20s, Commodore 64s, PETs and CBMs of many types were there, standing quietly in the booths next to their proud young users. Of course there were other types of computers to be seen at the fair, but for obvious reasons, the ones that I concentrated on were owned and used by Commodore Kids.

I talked to six in all, and there may have been more that I didn't find. Each project, and the mastermind behind it, is worthy of an article all its own, but unfortunately I don't have enough space to do them all justice. I will try to capture for you the essence of these projects, and their creators. Believe me, while talking to some of these young scientists, I wished that I had paid more attention when I was in school!

Dan Wilson, 18,
Rapid City, South Dakota

Dan's project, called "Wavelength Isolation Using Birefringent Polarization", consisted of an experiment in which he used the transparent plastic wrappers from a certain brand of cigarettes (!) among other materials, to filter light, which he then analyzed and photographed. He designed a program on his 4032 to do all the calculations and display his results and conclusions. Photographers and astronomers are showing quite an interest in Dan's discoveries, and his project won an award from the American Patent Law Association, in addition to two other awards.

Dan Wilson

Dan had taken eight months of computer programming when he decided to use a PET 4032 for his project. He credits Georgia O'Connor, his computer teacher at Stevens High School in Rapid City, for generating the computer enthusiasm and knowledge he needed to create the programs necessary for his project. Dan's interest in photography led to his choice of project, and after discovering the unique properties of the cigarette covering, he designed and built a prototype of a variable color filter system that he says will be more versatile and less expensive than the glass filters that are currently being used. As you might imagine, the particular brand of cigarette wrapper he "discovered" remains a well kept secret!

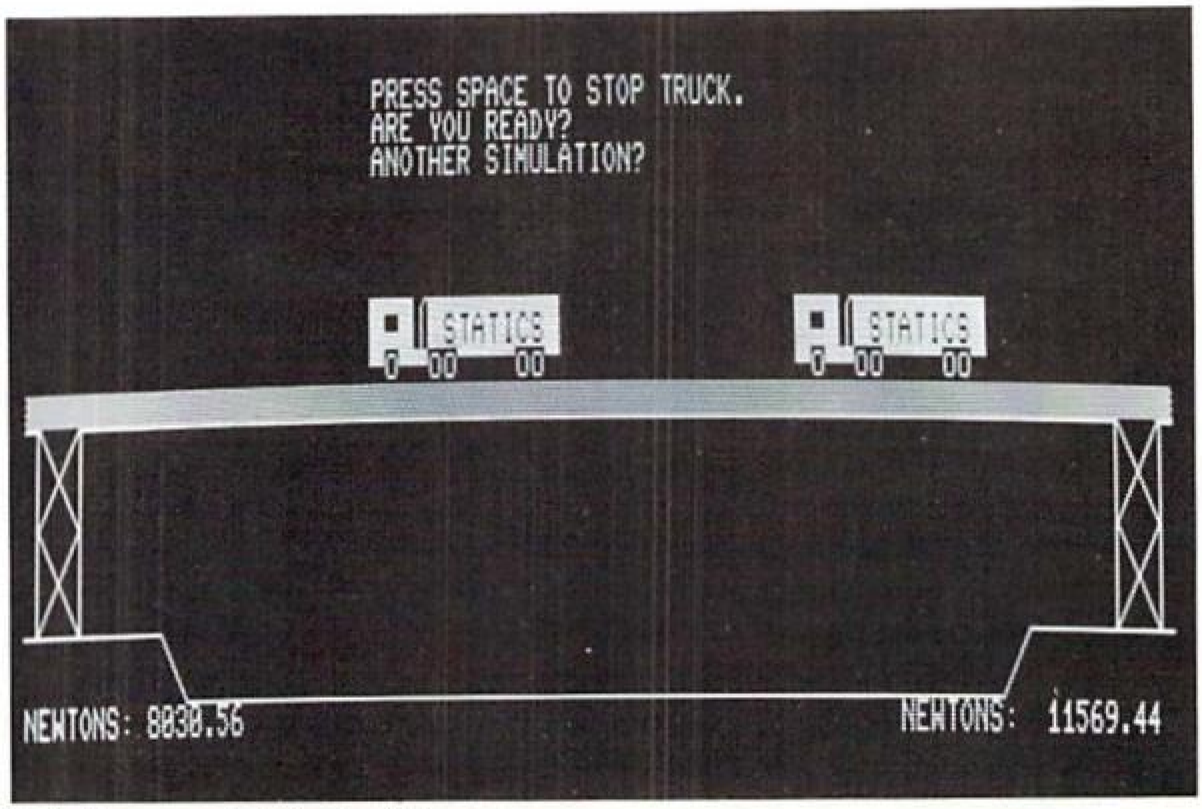
Rudy Timmerman, 15,
Wickes, Arkansas

"Computer Simulated Statics" was the name of Rudy's project. He informed me that "statics" is a branch of physics that deals with stresses and their effects on different materials. This project, part of which deals with the stresses involved in building bridges, was a natural for a boy whose grandfather was an engineer who built bridges. The fact that his father is a physics teacher also influenced Rudy's choice.

Rudy taught himself program-

PET STATICS

Rudy Timmerman



```
PRESS SPACE TO STOP TRUCK.
ARE YOU READY?
ANOTHER SIMULATION?

NEWTONS: 8030.56                    NEWTONS:  11569.44
```

Rudy Timmerman's statics simulation screen.

ming on an 8032 computer in order to use it for his project. With only four months' programming experience, he wrote simulation programs, complete with graphics, that would, in my humble opinion, daunt many a more experienced user. To reach the ISE finals Rudy placed first in his local, county and regional fairs, and second at the state level. The latest project that Rudy and his computer have embarked on is writing adventure games. He sent me a copy of one that is really interesting and exciting! It was a bit too long to publish, but I hope he keeps up the good work, in both fields.

Bill Wilcox, 16,

Parkersburg, West Virginia

"The Advantage of a Radially Stressed Membrane as a Sound-Light Interface" is the impressive sounding title of the project that

Bill Wilcox

Bill Wilcox used his VIC 20 to create. Bill is another self-taught programmer, and he put his programming skills to good use when he interfaced his VIC to an amplifier and speaker system through the user port.

This project was a bit hard for *this* "lay person" to understand, but if I have it right, Bill reflected a laser off a "radially stressed membrane" so that the user could actually see the accuracy of a computer-generated sound waveform. He used the Super Expander to access the VIC 20's high resolution graphics so that he could portray the resulting mathematical analysis of the "Lissajous Figures" and sine wave forms.

I might not have the background to totally understand Bill's accomplishments, but a lot of experts at the ISE Fair certainly did! Bill received a fourth prize in physics, a third from the Society of Photographic Scientists and Engineers, a second from the Acoustical Society of America and an Honorable Mention from Kodak. According to Bill, one of the possible applications of his project is absolutely precise tuning of musical instruments. He hopes he will be able to acquire a Commodore 64 soon, and it will be interesting to see what he can do with the 64's SID chip!

Allen Ingling,

Delaware, Ohio

"An Eight-Bit Digital/Analog Converter" was the name of Allen Ingling's project for the ISE Fair. What Allen did was use a Commodore 64 to control a servo antenna, a piece of hardware that looks very much like a miniature satellite dish. Allen told me that his Digital/Analog converter could be used to control any analog device, but he chose the little servo antenna because he had easy access to one.

Since I had met my first computer-controlled home robot, TOPO, the day before the ISE Fair, I immediately asked if this included robot arms (TOPO lacks a working arm) and Allen assured me that it did, providing proof that Commodore Kids are able to do things that were science fiction only a few years ago!

Allen Ingling

Allen taught himself BASIC on his 64, an example of my own personal belief that self-taught programmers are sometimes the most innovative. In fact, most of the kids I talked to at the fair had little or no formal training in programming, although they had written some very sophisticated programs to use in their projects.

Brent Hinkle, 15,

Friona, Texas

Brent's project was "Cloverleaf Knots—Do They Conform to Knot Theory?". Since I was not aware that there actually *was* such a thing as knot theory, Brent had to be *very* patient with me as he attempted to describe his project.

According to Brent, mathematicians, particularly those in a branch of mathematics called topology, have devised a way to mathematically describe the paths taken in the formation of certain knots. Brent became interested in these formulas after reading an article by topologist Lee Neuwirth in *Scientific American.* His project consisted of trying to prove or disprove certain theories put forth by Neuwirth, touching on the probability that cloverleaf knots are mathematically equal to another type of knot, described to me by Brent as the kind of knot I use to tie my kids' shoes.

This all became a little clearer to me when Brent described the practical applications of his research. He explained that these theories could be useful in computing certain things having to do with electrical circuits, population fluctuation or even in making predictions about ecological systems. In short, he said they could apply to anything cyclic, or anything that goes through some type of cause and effect cycle.

CLOVERLEAF KNOTS:

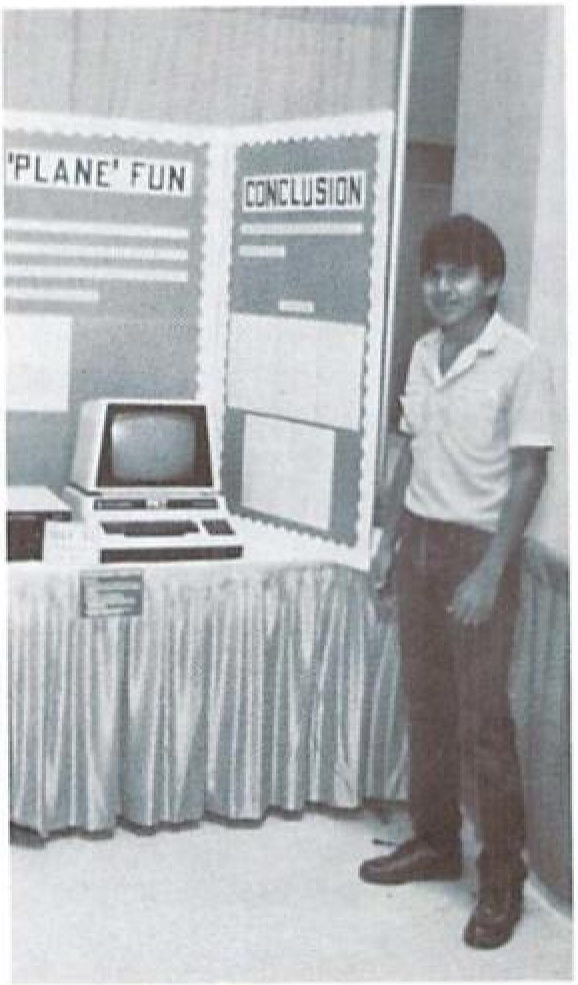
Brent Hinkle

Brent used his Commodore 64 to do all his calculations, and as a display aid to illustrate a cloverleaf knot "deforming" into the other type (shoelace knot). Brent learned programming on a PET computer at Friona High School, and is spending the summer programming games on his 64. He says he misses having a local place to acquire software for his Commodore, and wishes he could get in touch with a user group so that he could at least have access to some of the public domain games rather than having to type them in from scratch.

Richard Begay,

Crystal, New Mexico

Richard and I were only able to talk about his project for a few moments, so I have very little information about it, unfortunately. The project, called "Plane Fun" was in the computers and mathematics category, and consisted mainly of a computer program to illustrate and teach plane geometry. The teacher who accompanied Richard, Paula DeLairro, was very enthusiastic about the project and Richard's programming ability, as the judges must have been, since Richard won top honors in the Arizona region! (He attends school in Tuba City, Arizona.)



Richard Begay

Eugene Sargent

Eugene Sargent, 16,

Fayetteville, Arkansas

A project called "Experimenting With Robot Design" brought Eugene to the ISE finals, and an interesting and timely project it certainly was. This was a project I had quite a bit of interest in, having fallen in love with the idea of robots and all their possible applications; friends and helpers at home, in schools, in industry or helping us inhabit outer space!

Eugene emphasized that *his* robot was only a very simple example among all the robot possibilities, but I was extremely impressed with the fact that a high school junior with little or no training in electronics OR computer programming could accomplish what Eugene did. He built his robot on a *very* low budget ($40), using old computer parts he salvaged at Fayetteville High School. He then interfaced it with a VIC 20 computer he had received as a Christmas gift. The interface was connected through the user port, and used a control circuit, buffer and power supply—all of which he made himself. He used the potentiometer in the VIC paddleport to update the computer on the position of the robot's steering column.

When I asked Eugene what advice he had for other kids who might want to make a VIC-controlled robot, he recommended a group of books published by Tab publishing company that deal with designing and building robots. Eugene is currently learning to program hi-res graphics on his VIC (he doesn't have a Super Expander) and would like to learn machine language in order to speed up the "thought" processes and learning abilities of future robots he wants to build. **C**

A Printer Character Generator for the Commodore 64

by Josh Rai

Josh Rai

Ten-year-old Josh Rai was introduced to computing two years ago, in the third grade, when he began to use a PET at the John F. Kennedy School in Great Neck, New York. He really became intrigued by computers in December, 1981, when he and his sister got a VIC 20 for Christmas. He learned alot about programming from the VIC manual, the Programmer's Reference Guide *and from Arnie Friedman, a high school teacher who gives private classes for kids and runs the Great Neck adult education computer program. The rest of Josh's family knows virtually nothing about computers and usually cannot help him.*

Josh got a Commodore 64 in February, 1983, because he wanted to learn more complicated things, including machine language (which he still has not figured out). Besides programming, he likes writing, playing the violin, baseball and tennis.

The Printer Character Generator is a program that allows you to define a character 35 × 21 pixels large on the VIC 1515 printer. (It has only been used on the VIC 1515, but will also work on the 1525.)

To begin with, you are a blue cursor on a large white square. Move by pressing T for up, V for down, F for left and G for right. Press the SHIFT key to turn on a dot and the COMMODORE key to turn it off. To make or erase a line, *hold down* SHIFT or COMMODORE while you move. You may also clear the screen and start your character over by pressing SHIFT and CLR/HOME. You can reverse the character if you press R.

When satisfied with your character, press the + sign and wait for about ten seconds. It will print your picture on the printer and ask if you want to edit it. If you do, type in yes and edit (or clear the screen and make another character). But remember, only one character can be in memory.

If you do not want to edit, you will come upon another question: DO YOU WANT TO PUT THE CHARACTER INTO DATA STATEMENTS? Saying yes would erase the program (be careful about that; the character generator would be NEWed) and make a new program with data statements and an extra two lines, so if the program is run, it will print the character again. You see, the computer would do all the work by making a SAVEable program where all you have to do is say RUN and it prints your character.

Lines 10 to 40 and 700 to 820 set the variables and give the instructions.

Lines 40 to 49 make the box.

Lines 60 to 130 let you move.

Lines 140 to 182 print the character on the printer.

Lines 183 to 230 check to see if you want to edit it.

Lines 310 to 340 check if you want to put the character into DATA statements.

Lines 350 to 380 make the DATA statements. **C**

Printer Character Generator

```
10 DIM LO(15),P$(15):FOR T=1 TO 15:READ LO(T):NEXT
20 POKE 53281,0:POKE 53280,0:POKE 646,1
23 GOSUB 700
30 PRINT"[CLEAR]"
40 X=0:Y=0:N=1
45 PRINT"[HOME]";
47 FOR S=1 TO 7:PRINT"[RVS,SPACE35]"
48 PRINT"[RVS,SPACE35]"
49 PRINT"[RVS,SPACE35]":NEXT
60 POKE LO(1)+X+(40*Y),6
70 POKE LO(1)+X+(Y*40)+N,1
73 IF PEEK(653)=1 THEN POKE(LO(1)-54272)+X+(Y*40),209
   :POKE LO(1)+X+(Y*40),4
77 IF PEEK(653)=2 THEN POKE(LO(1)-54272)+X+(Y*40),160
   :POKE LO(1)+X+(Y*40),1
80 IF PEEK(197)=22 AND Y>0 THEN N=40:Y=Y-1:GOTO 120
90 IF PEEK(197)=31 AND Y<20 THEN N=-40:Y=Y+1:GOTO 120
93 IF PEEK(197)=21 AND X>0 THEN N=1:X=X-1:GOTO 120
95 IF PEEK(197)=17 THEN GOSUB 900
97 IF PEEK(197)=26 AND X<34 THEN N=-1:X=X+1
115 IF PEEK(197)=51 AND PEEK(653)=1 THEN 45
117 IF PEEK(197)=40 THEN 140
120 POKE LO(1)+X+(Y*40)+N,1
130 GOTO 60
140 PRINT"[HOME,DOWN21]JUST[SPACE]A[SPACE]MINUTE...";
143 FOR U=1 TO 15:P$=""
145 FOR T=LO(U)-54272 TO LO(U)-54266:W=1
150 FOR I=T TO T+240 STEP 40
160 IF PEEK(I)=209 THEN P=P+W
165 W=W*2:NEXT:P=P+128:P$=P$+CHR$(P):P=0:NEXT:P$(U)=P$
    :NEXT
167 PRINT"[HOME,DOWN21,SPACE16]"
170 OPEN 4,4:CMD 4
180 FOR T=1 TO 5:PRINT CHR$(8)P$(T);:NEXT:PRINT
181 FOR T=6 TO 10:PRINT CHR$(8)P$(T);:NEXT:PRINT
182 FOR T=11 TO 15:PRINT CHR$(8)P$(T);:NEXT
183 PRINT#4:PRINT"[HOME,DOWN22,L. GREEN,RVS]WANT[SPACE]TO
    [SPACE]EDIT[SPACE]YOUR[SPACE]CHARACTER?[WHITE]"
200 CLOSE 4:GET A$:IF A$=""THEN 200
210 IF A$="N"THEN 310
220 IF A$<>"Y"THEN 200
225 PRINT"[HOME,DOWN22]O.K.[SPACE27]"
227 FOR T=1 TO 1000:NEXT
228 PRINT"[HOME,DOWN22,SPACE31]"
```

```
230 POKE LO(1)+X+(40*Y),1:GOTO 60
310 PRINT"[CLEAR]WANT[SPACE]TO[SPACE]ERASE[SPACE]PROGRAM
    [SPACE]AND[SPACE]PUT[SPACE]YOUR[SPACE]15[SPACE]
    CHARACTERS[SPACE]INTO[SPACE]DATA?"
320 GET A$:IF A$=""THEN 320
330 IF A$="N"THEN END
340 IF A$<>"Y"THEN 320
350 PRINT"[CLEAR,DOWN2]";:L=1:C=1
360 PRINT RIGHT$(STR$(L),LEN(STR$(L))-1);"[SPACE]DATA
    [SPACE]";
365 IF C<>15 THEN FOR P=1 TO 2
366 FOR I=1 TO 7
370 PRINT RIGHT$(STR$(ASC(MID$(P$(C),I,1))),
    LEN(STR$(ASC(MID$(P$(C),I,1))))-1);
371 PRINT",";
373 NEXT:C=C+1:IF C<>15 THEN NEXT
375 PRINT"[LEFT,SPACE]":L=L+1:IF C<16 THEN 360
376 PRINT"1000[SPACE]DIMU$(15):FORT=1TO15:FORI=1TO7:READA
    :U$(T)=U$(T)+CHR$(A):NEXT:";
377 PRINT"NEXT"CHR$(13)"1010[SPACE]OPEN4,4:CMD4
    :FORT=0TO10STEP5:FORI=1TO5:";
378 PRINT"PRINTCHR$(8)U$(I+T);:NEXT
    :PRINT"CHR$(13)"1020[SPACE]NEXT:PRINT#4:CLOSE4"
390 PRINT"[HOME]";:FOR T=631 TO 642:POKE T,13:NEXT
    :POKE 198,12:NEW
500 DATA 55296,55303,55310,55317,55324,55576,55583,55590,
    55597,55604,55856,55863
510 DATA 55870,55877,55884
700 PRINT"[CLEAR]CHARCTER[SPACE]GENERATOR[SPACE]FOR[SPACE]
    THE[SPACE]PRINTER..."
710 PRINT"[DOWN2]BEFORE[SPACE]YOU[SPACE]USE[SPACE]THIS,IT
    [SPACE]IS[SPACE]ASSUMED[SPACE]THAT[SPACE2]YOU[SPACE]
    HAVE[SPACE]A"
720 PRINT"[DOWN,RVS,MAGENTA]PRINTER,ASSEMBLED,AND[SPACE]
    WITH[SPACE]PAPER.[WHITE]"
730 PRINT"[DOWN3]IF[SPACE]YOU[SPACE]DO[SPACE]NOT[SPACE]
    HAVE[SPACE]THIS,THEN[SPACE]THIS[SPACE]PRO-[SPACE2]
    GRAM[SPACE,RVS,MAGENTA]WILL[SPACE]NOT[RVOFF,WHITE,
    SPACE]WORK!"
740 PRINT"[DOWN2]IF[SPACE]YOU[SPACE]DO[SPACE]HAVE[SPACE]A
    [SPACE]PRINTER,PRESS[SPACE]A[SPACE]KEY[SPACE]TO[SPACE]
    BEGIN."
745 PRINT"[DOWN,RVS]NOTE:THIS[SPACE]PROGRAM[SPACE]IS
    [SPACE]ONLY[SPACE]KNOWN[SPACE]TO[SPACE]WORK[SPACE]ON
```

```
     [SPACE]THE[SPACE,RVOFF]VIC-1515[RVS,SPACE]PRINTER."
 750 GET A$:IF A$=""THEN 750
 760 PRINT"[CLEAR]T[SPACE]=[SPACE]UP"
 761 PRINT"V[SPACE]=[SPACE]DOWN"
 762 PRINT"F[SPACE]=[SPACE]LEFT"
 763 PRINT"G[SPACE]=[SPACE]RIGHT"
 770 PRINT"[DOWN,RVS]+[RVOFF,SPACE]TO[SPACE]PRINT[SPACE]
     AND[SPACE]KEEP[SPACE]CHARACTER[SPACE]IN[SPACE]MEMORY"
 775 PRINT"[DOWN,RVS]SHIFT/CLEAR[SPACE]HOME[RVOFF,SPACE]TO
     [SPACE]ERASE[SPACE]CHARACTER[SPACE]&[SPACE]DO[SPACE]
     IT[SPACE]OVER"
 777 PRINT"[DOWN,RVS]R[RVOFF,SPACE]TO[SPACE]REVERSE[SPACE]
     CHARACTER"
 778 PRINT"[DOWN](MAKE[SPACE]A[SPACE]--G--[SPACE]TO[SPACE]
```

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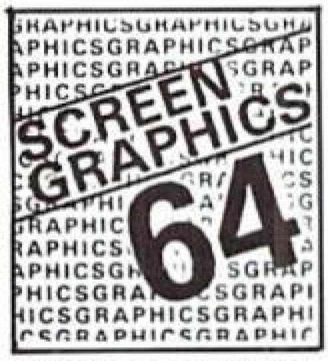

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```
    A[SPACE]--[RVS]G[RVOFF]--[SPACE]OR[SPACE]A[SPACE]--
    [RVS]G[RVOFF]--[SPACE]TO[SPACE]A[SPACE]--G--)"
780 PRINT"[DOWN,RVS]SHIFT[SPACE]KEY[RVOFF,SPACE]TO[SPACE]
    TURN[SPACE]ON[SPACE]DOT"
790 PRINT"[DOWN,RVS]COMMODORE[SPACE]KEY[RVOFF,SPACE]TO
    [SPACE]TURN[SPACE]OFF[SPACE]DOT"
800 PRINT"[DOWN4]PRESS[SPACE]ANOTHER[SPACE]KEY"
810 GET A$:IF A$=""THEN 810
820 RETURN
900 FOR T=1 TO 15:FOR U=LO(T)-54272 TO LO(T)-54266
    :FOR I=U TO U+240 STEP 40
905 IF PEEK(I)=160 THEN POKE I,209:GOTO 920
910 IF PEEK(I)=209 THEN POKE I,160
920 NEXT:NEXT:NEXT:RETURN
```

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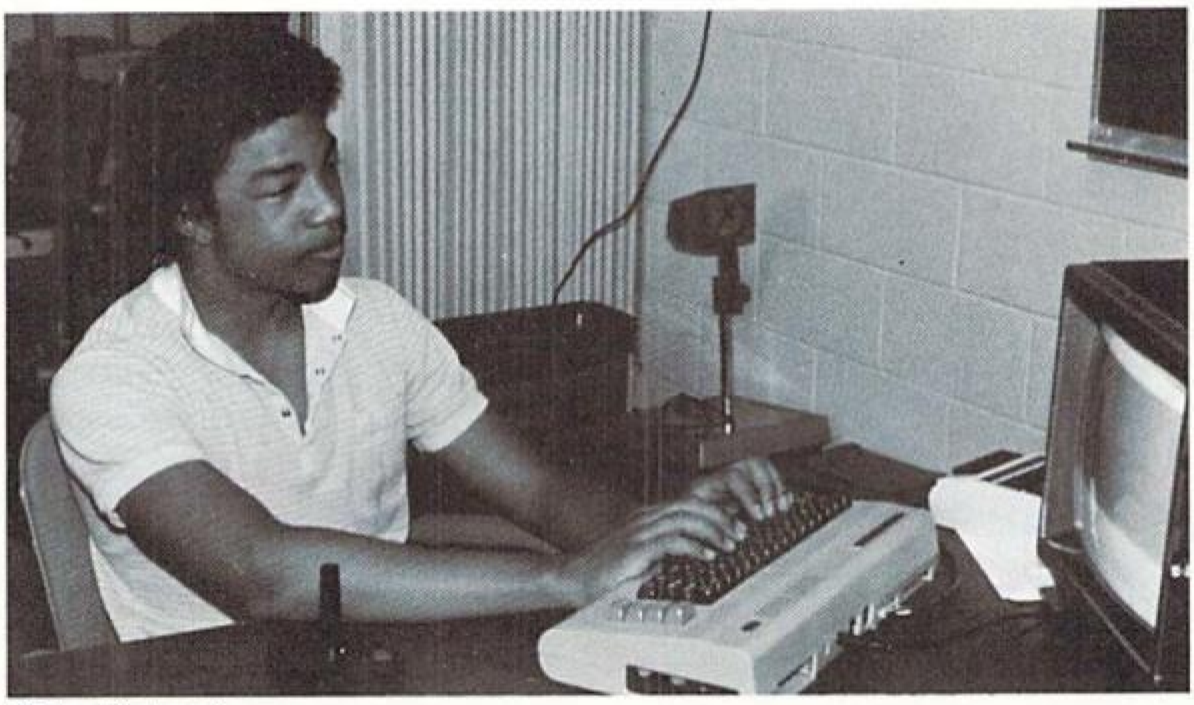
Who Needs A Word Processor? ..I Do!

by Richard Kotomori, Jr.

Richard T. Kotomori, Jr. is a 15 year-old student who attends the Albuquerque Academy. He has been using his Commodore 64 computer since October, 1982. His first exposure to a computer was in September, 1982, when he took a programmed instruction course in elementary BASIC programming.

He currently uses the family's Commodore 64 for writing and storing his notes, writing term papers, using drill-and-practice programs for studying his English and Spanish vocabulary words and, of course, for games. He presently has little interest in computer programming but makes practical use of the computer almost every day.



Richard Kotomori

"Oh no, not another English paper," used to be my response when an assignment was given to me. This anxiety was caused by my previous experience with English papers, and by this time, if I had learned anything from English, it was that I hated it.

Staying up all night, arguing with my parents about making corrections, writing a second or third draft and making up excuses about why I hadn't started the assignment until the last night, are only some of the reasons I had hated English so much. I also despised the fact that we had to write papers legibly in ink or type them (both of which are time consuming). To top it all off, after such a hectic night, my grade, at best, would be a C. Simply because I had terrible handwriting and did not have enough time to type or spell didn't mean that I should always get a lower grade. At least, *I* didn't think so.

That was before we bought a Commodore 64 and a word processor, which, according to the description, allows you to "keep menus, financial data, mailing lists, prepare and print letters and reports." I was only interested in an easier way to complete my assignments as quickly as possible. With a word processor you can do anything you can do with a typewriter plus edit easily (without white-out correction fluid), save copies that can be referred to at a later date and even save legible school notes throughout the year.

Everyone in my family has benefited from this program. It helps my father with his letters (especially when multiple copies are needed) and with his software reviews; my mother with her volunteer work committee reports, and invitations; even my little seventh-grade brother has turned in papers written with the word processor. (But he still doesn't realize that an outline is necessary for a good paper.) As for me, the word processor has transformed me from a D student to a B+ student in English.

The word processor was very easy to master and is a blessing to anyone who has poor eyesight (me), especially with the 40-character display on the Commodore 64. Rewriting is a thing of the past, since rearranging lines, and paragraphs and formatting the text are so much easier. Now I can start my assignments while my ideas are fresh, type for a while, save and continue later with new ideas. It is just not as boring as it used to be; and with the whole family looking over my shoulder, I have fewer mistakes (my best paper had only one error). A computer with a word processing program is a good investment for the whole family. **C**

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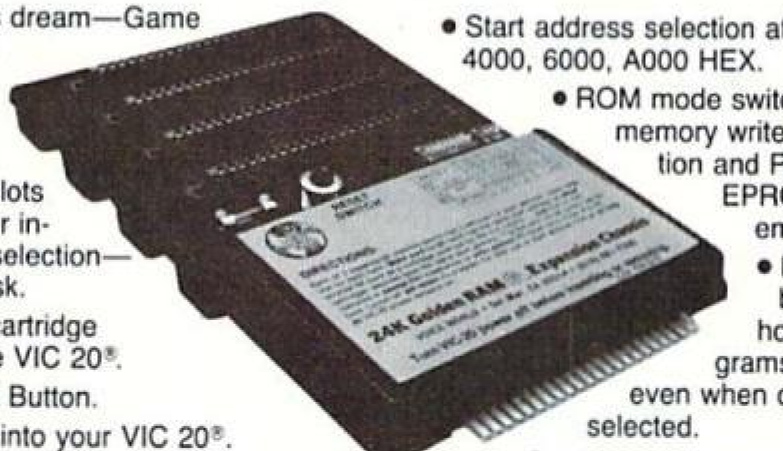

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Confessions Of A Computer Whiz-Kid's Sister

by Diana Scimone

I knew it was all over the day he told me he was learning PASCAL in high school and I thought he was studying French philosophy.

Things went steadily downhill from there.

It's not easy having a computer whiz-kid for a brother—especially when he's only half your age. Take, for instance; the Saturday morning he tried to teach me to play *Robot Attack,* one of the games he designed. While I was oohing and ahhing over the tiny little robots running helter-skelter around the screen, my brother, TJ, patiently explained how to turn his VIC 20 on, and then how to move the joystick to make the cute little men avoid being blown to pieces. After a few minutes of instruction, he turned the computer off and in a voice usually reserved for training dogs to fetch a stick, gave me my first assignment: turn the computer back on…

To this day, I have never played *Robot Attack* again.

Ah yes, I remember an earlier time, back when life was simpler, when younger brothers played with frogs and fire trucks.

It all started a year ago when TJ was just 15 years old—the day his parents put their collective feet down. My father, a reasonably successful business man, was amazed at the high cost of living. Where, he wondered day after day, did his hard-earned money go? Alas, it was not long before my mother solved the mystery: TJ was methodically converting large portions of my father's paycheck into quarters, which were systematically disposed of at the neighborhood arcade.

What could my parents do? Rather than forking over quarters for the rest of their lives, they decided it would be easier—and a lot cheaper—to simply buy him a computer of his own. At least they would know where he was after school.

As fate would have it, TJ was not adverse to their decision, and immediately went out and selected a Commodore VIC 20, which soon became a permanent fixture in his room. Why a VIC, you may ask? TJ, it seems, had learned computerese right in his own high school, Good Counsel, in Maryland. There, unlike most schools, students do not rush home at the sound of the bell, but instead head for the computer room where 29 Commodore PET 4016s, printers and disk drives click away from sun up to sun down.

Since he no longer frequented arcades, it was simply a matter of trial and error (as he modestly recounts it) before he learned how to program his own array of video games: *Froggy Hop, Robot Attack, Crunch!, Ghost Town* and even a few educational programs to boot.

Now, I may not know computerese, but I am not entirely ignorant. I recognized that something had to be done soon: my brother had already mastered BASIC and Assembly, and was about to learn PASCAL. We were no longer speaking the same language. I knew I had to do something before I lost contact with him forever.

I began taking a slight interest in my enterprising brother. He was so far ahead of my limited technical knowledge that I could only marvel when he attempted an in-depth explanation of his latest creation. Instead of hiding the fact that he was a computer whiz-kid, I began telling my friends. I carried his picture in my wallet and at the drop of a hat would go to great lengths to explain his marvelous accomplishments. Friends were quite patient in putting up with my sibling pride.

Soon I began to get involved in more than just a passive way. When TJ wanted to copyright his programs, guess who spent the better part of an afternoon on the phone trying to decipher the myriad of regulations at the Patent Office? It was a small price to pay for glory so near to my branch of the family tree.

TJ's fame spread. He and a computer buddy, Matt Shannon, formed Oakly Software Company and began marketing their goods—over 20 games and educational programs between them. From store to store they would peddle their wares, and soon every software rack in Rockville, Maryland, displayed the blue Oakly Software packages that had become so near and dear to my heart.

But in spite of TJ's business acumen, he was still only 15—not even old enough to drive in Maryland. So his mother, in a twist of the chauffeur role endured by so many parents of teenagers, began driving him from store to store. Hours at a time she would patiently wait in the hot car while her son, the junior executive, would chat with buyers in air-conditioned comfort. After all, what's a mother for, anyway?

One day an odd thought came to TJ: Why not get a job in a computer store? And so he proceeded with the time-honored tradition of beating the pavement.

While he was filling out an application in one store, a customer asked him a question, and in a matter of moments, TJ had sold her some software. The owner offered him a job on the spot.

When TJ's 16th birthday rolled around, it was no surprise to any of the family members that he did not want a tie. Oh, no. He had already picked out a flashy modem at his new place of employment. Now his parents look forward to the monthly phone bills and the new game of "I didn't call Chicago; did you call Chicago?" Meanwhile, AT&T stock continues to soar.

School is now out for the summer, and in between working on getting that all-important driver's license, TJ is under contract to design some business programs for his high school. He'll also be teaching BASIC and the basics to a local Commodore 64 users group.

Future plans include taking more computer courses during senior year, looking for a college with a strong major in computers and talking with a national publishing company, which approached him about purchasing some of his educational wares.

Meanwhile, I have a little project of my own: I am making an audio tape of the click-click-clicking of VIC 20 keys to play when my computer whiz-kid brother goes away to college so I won't miss him too much. C

Diana Scimone is a Washington DC-based freelance writer who writes a regular column for Europe, *the magazine of the European Community. She served as Washington correspondent for* Video Systems *for two years, and has contributed to* Science 80 *and* 81, Travel/Holiday, *and* USA Today, *among many others.*

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For Grown-Ups Only

This issue's hints to grown-ups come from Stephen Erwin, president of the National VIC 20 Program Exchange in Portland, Indiana.

Longer Variables for Easier Reading by Kids

The concept of variables is one of the most difficult for children to grasp. To understand that X can equal a certain number of apples or bananas is very hard for them to visualize. It is even harder to see that X can equal any number of apples we assign to it and that the number can change. Even when they do understand this, it can be very hard for them to keep track of what each of those X's or Y's represent.

From the standpoint of teaching children programming or having them easily follow a program written for them, it would be so much better if we could use words instead of X's or Y's.

Well, the fact of the matter is that you can. Apple, banana, ball and sum are all legal variable names. VIC will list them and use them. There are, however, some very specific limitations that you must observe in order to use them.

VIC will use any reasonably sized word as a variable, but only the first two letters count. Two different words with the same two starting letters will be listed differently, but will function as the same variable when the program is run. Therefore girls, giblets, and gifts will all list differently, but will be treated as the same variable.

The second limitation is that these words cannot contain any BASIC words. In one program I wrote, I thought I'd be smart and use MONTH and COST as variables. Can you see the problem? MONTH contains ON and COST contains COS. Both are BASIC words. It is best to use the following simple program to test your variable words.

```
CLYDE = 10 : PRINT CLYDE
```

If this program works the name is legal. With this you will find that although ABRAKADABRA ALAKAZAM can equal 10, ANTIDISESTABLISHMENTERIANISM can't because it contains a TAB.

I hope you will have a little fun with this, and that it will help you write more understandable programs for your Commodore kids.

Kid-Proof Your Programs with $trings.

Syntax Error in 540. Many are the hours I've sat staring at a perfectly good-looking program line that kept producing that statement. It always gives me a great sense of satisfaction when I find my mistake and realize that the @!*? computer didn't malfunction after all.

It is a different story altogether when this happens to a child who is just learning to use a computer.

As a general rule, you should test the contents of input statements, but with small children it is especially important to make programs user friendly and crash-proof. There is nothing that can be more frustrating to a little one than being left sitting there wondering what went wrong.

Inputs with numerical variables can cause many of these problems because they will automatically cause a redo-from-start error if any non-numerical character is typed in for any reason. If you stick to string inputs then the program will crash only if you fail to write a good program that tests the strings for all possible problems.

To aid in testing, VIC BASIC has a whole series of functions that can be used. Before we get to these, however, I should remind you that you cannot set a string variable equal to a numeric variable. One or the other must be converted so that they are both strings or both numbers.

To convert a number to a string use the STR$ function:

```
10  X=10
20  X$=STR$ (X)
```

To convert a string to a number, provided the string is composed of numbers, use the VAL function:

```
10  X$= “ 10 ”
20  X=VAL(X$)
```

Now let's look at the testing of strings. Often you will want to limit the number of characters in a number or word. The LEN function lets you do this:

```
10  X$= “ 4768 ”
20  Y=LEN(X$)
30  IF Y>3 THEN PRINT “ 3 DIGITS ONLY ”
```

You can test the contents of a string with the ASC and CHR$ functions and tables.

```
10  A$= “ G ”
20  IF ASC(A$)<48 OR ASC(A$)>57
    THEN PRINT “ ENTER #'s ONLY ”
```

The range of ASCII codes for numbers is 48 to 57. Letters range from 65 to 90.

```
10  A$= “ 5 ”
20  IF ASC(A$)<65 OR ASC(A$)>90 THEN
    PRINT “ ENTER LETTERS ONLY ”
```

To test inputs longer than one character the LEFT$, RIGHT$ and MID$ functions will separate out individual characters. LEFT$ (X$,A) gives you the left-most A characters of X$. If X$= “ TONY ” the LEFT$ (X$,2) = TO. RIGHT$ works the same way from the right side. RIGHT$ (X$,2) = NY. MID$(X$,A,Y) gives you Y characters starting at position A. MID$(X$,2,1) = O. MID$(X$,3,2) = NY. MID$(X$,1,4) = TONY

If you wish to test a number for a dollar sign do this:

```
10  X$ = “ $100 ”
20  IF ASC(LEFT$(X$,1)) = 36 THEN X$ =
    RIGHT$(X$,LEN(X$) –1)
```

The ASC for $ is 36. RIGHT$(X$,LEN(X$)–1) is X$ without the dollar sign. We can then test X$ to be sure it is all numbers:

```
10  FOR T = ! TO LEN(X$)
20  IF ASC(MID$(X$,T,1))<48 OR
    ASC(MID$(X$,T,1))>57 THEN PRINT
    “ NUMBERS ONLY ”
30  NEXT
```

This simple routine uses MID$ to separate and test each character of the string.

The possibilities are almost endless, and when they result in a program the kids can't crash, very satisfying. **C**

> As a general rule, you should test the contents of input statements, but with small children it is especially important to make programs user friendly and crash-proof. There is nothing that can be more frustrating to a little one than being left sitting there wondering what went wrong.

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“Terrific”

by Betsy Byrne

A sneak preview of Commodore's speech module for the Commodore 64, scheduled for release this fall.

One afternoon as I maneuvered to get in our front door with the fruits of an afternoon at the grocery store, I was almost bowled over by my five year-old daughter, Molly, who was shouting, “Mommy! The 64 says I'm TERRIFIC!”.

Before I could find out what in the world she was talking about, my husband Dan called, “Honey, listen to this!” and from the direction of our computer room (it used to be the kitchen) I heard an unfamiliar feminine voice reciting the ABC's.

“It's here?” I asked, as I hurried toward the source of all this excitement (our family Commodore 64). “The SPEECH MODULE came while I was out?”

Dan didn't need to answer, since the first thing I saw when I entered the kitchen was a large, unknown cartridge nestled in the 64's game port. “W,X,Y,Z.” finished the pleasant voice, as the corresponding letters appeared on the screen.

That scene was played two weeks ago, the day that a prototype of Commodore's new speech module arrived at our house. The way our family feels about the 64 has been subtly changed since the arrival of its “voice”. Somehow the computer is more a “real member of the family” now that it can communicate with us verbally. The three youngest members in particular now tend to say “she” or “her”, rather than “it” or “the 64”.

After all, a voice synthesizer was the computer accessory that had headed our “most wanted” list ever since Timmy had dubbed the Speak and Spell “the magic toy” at his first computer show. Needless to say, we were *very* disappointed when we found that the prices on the popular models available were way over our accessory budget. They cost as much as a printer, for heaven's sake!

None the less, we *might* have managed one, until we actually *heard* one in action. The voice that was demonstrated for us at a local store sounded harsh and mechanical, and worst of all, the kids could barely understand it! We were told that it was “state of the art”, and that it would be some time before anything better came along. Well, folks, “some time” is NOW, or at least early fall of this year, when the Commodore speech module is slated to become available in retail stores.

I had read some new product releases about the 64's planned speech module, but none of them had prepared me for my own reaction to it or my family's. I had assumed that to program it we would have to use phoenemes, pieces of words representing sounds, since that was the way the one we had seen demonstrated had worked. On the contrary, to program *this* one, all we have to do is type SAY “PLEASE” and press RETURN, and by golly, it SAYS PLEASE! I only wish I could program my kids to say PLEASE that easily.

Each word in the module's 235-word built-in vocabulary has been assigned a number, so if I want to have the computer SAY a sentence, the easiest way I have found to do it from BASIC (so far) is to put the numbers in a data statement:

```
10 for I=1 to 6
20 READ I
30 SAY I:NEXT
40 DATA 138,158,78,
   137,133,82
```

The computer will then say: “Not bad, what next from Commodore?”

Not bad, indeed, since I am not much of a programmer, as my family would be quick to tell you! Nothing else we have ever acquired for the computer has inspired me to these heights. Seven year-old Timmy is up at six lately, so that he can put in some time programming the 64's voice to talk to his twin brother, James, before they leave for the day.

But enough about programming for now; there are sure to be *lots* of articles on that aspect of the module in future issues of both of Commodore's magazines. Is this new, magical-seeming electronic marvel REALLY going to change the way we use our computers? To that I would answer an unqualified YES INDEED. It will change not only *how* we use them, but also *what* we use them for, *where* they are used, and the people *who* will be able to use them!

Small children will be able to use computers as never before, no longer handicapped by their temporary lack of reading skills. In fact, it will now be a breeze for them to acquire those very skills, with the help of the talking computer. Witness the program that came from Commodore along with the speech module: a plug-in cartridge that fits in the slot on top of the module, and not only says the alphabet while printing the letters to the screen, but also contains a game that teaches recognition of both upper and lower case letters.

Speaking of handicaps, what about children (and adults) who have impaired vision or are blind? If the module were integrated into a word processor, it would give them the ability to do schoolwork, (or office work) that a braille writer couldn't begin to match, not at the less than $100 price tag of the speech module, anyway.

It might not be a bad way for deaf people to communicate over the phone, either. Now don't misunderstand me; with a 235-word vocabulary the 64 can't really carry on a huge conversation, but by tying the module into the keyboard (the first program my husband wrote) it can SPELL anything you want it to!

Commodore programmers are already hard at work turning out more advanced educational programs, including some to teach foreign languages. Extended vocabularies for the module will also be available, not to mention a man's voice (my husband still hasn't gotten over the fact that *his* 64 is a female) and a child's voice ("Hey Molly! Let's play arithmetic!" it might say).

To the delight of all, Commodore programmers are also working on games that incorporate scaa-rry voices like some of the ones in the arcades, notably *Gorf* and *Wizard of Wor.* I don't know for sure why the people at Commodore's Speech Technology Division chose a woman's voice (I forgot to ask in all the excitement), but a friend who teaches Special Education tells me that there have been numerous studies done which show that young children react more strongly to, and learn more easily from, a feminine voice.

Whatever voice it speaks with—man, woman, child or storybook hero—I think the talking computer has finally come of age. I will continue the saga of my family and our talking Commodore 64 in future issues, and I would like to hear from *you,* both children and adults. Write and tell me about your computing experiences and ideas, talking or otherwise. I can't promise to answer all your letters (I haven't written my *mother* since 1981) but I will certainly read them all, and publish the most interesting, thought provoking or representative ones. **C**

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A Keyboard Overlay for Your Programmable Function Keys

by Paul Zander

If you sometimes can't quite remember what your programmable function keys are supposed to do in different programs, here's the solution. A simple overlay, labeled with the program name and the purpose of each function key. And you can create it right on your printer.

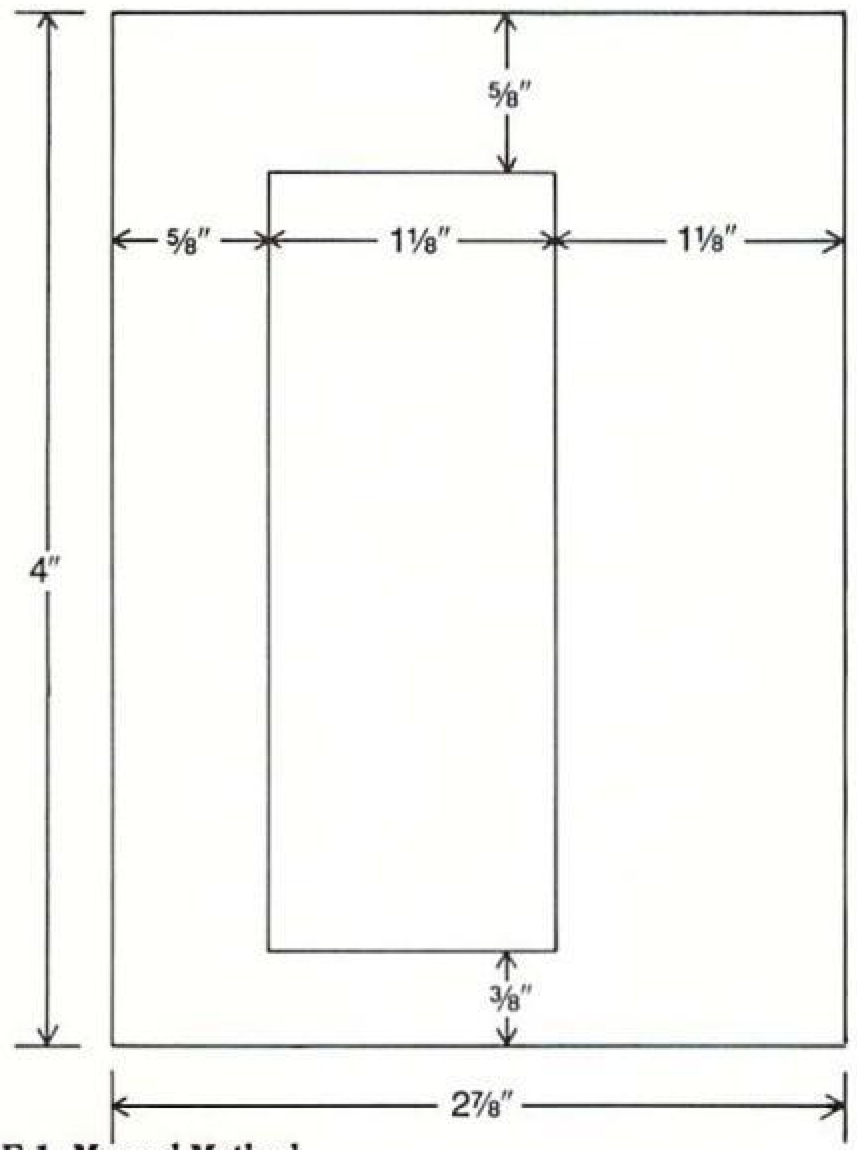


FIGURE 1. Manual Method

Recent articles have explained the use of the programmable function keys on the VIC 20 and the Commodore 64. (See the VIC Magician, "Using Those Mysterious Programmable Function Keys" in *Power/Play,* Spring 1983 or *Commodore,* June/July 1982.) In addition, several cartridges and software products set up these function keys to make the computer easier to use. If you have a variety of programs that use special function keys, it may become difficult to remember what each key does. For instance, "f2" may be used to print the contents of the screen, GOTO some coordinate, or produce a BASIC statement such as COLOR.

You can easily make a very inexpensive (almost free) keyboard overlay for each of your applications that will sit over the function keys on the keyboard. You can make a different one for each application. It can be constructed from plain paper, cardboard, or even thin plastic. Here's what you need to do.

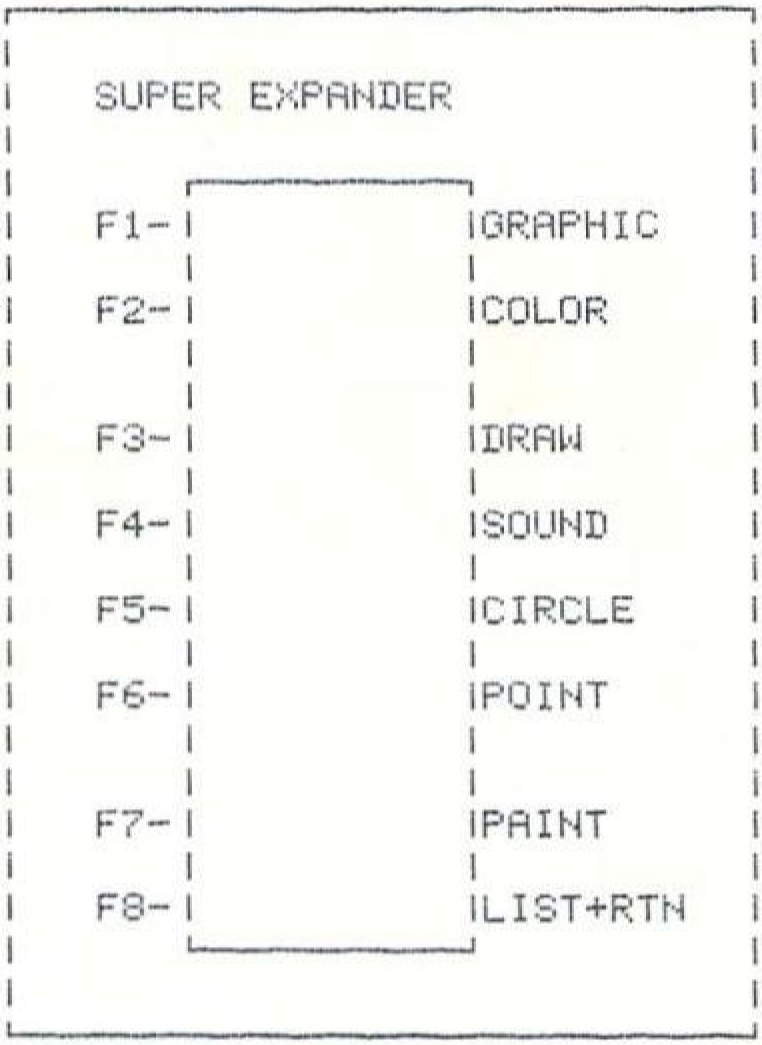
Manual Method

Obtain a piece of paper (or suitable material) at least 3 inches wide by 4 inches long. Draw the measurements from Figure 1 on the paper. You'll be cutting out the rectangle in the center to fit over the keys. Write the name of the application at the top, the function key (i.e., f1, f2, etc.) on the left and what the key does on the right. There's not much room on the right side, so you may have to abbreviate. Cut out the figure along all lines. Place the overlay over the function keys and you're in business. Don't be discouraged if you goof; the overlays are easy and cheap enough to redo.

Automated Method

If you write a lot of programs that use function keys, you could end up with a lot of overlays to build. If you have a printer such as the 1525E, here's a little program to build a very neat, properly sized overlay automatically. Just cut it out after the form has printed. There's an option to "PRINT AGAIN?" so that you can make a few spare overlays. This program works "as is" on both the VIC 20 and the Commodore 64. (Figure 2, the sample output below, can be used with the VIC 20 Super Expander cartridge.) The program will ask you to enter a 20-character title followed by a 10-character value for each of the eight function keys. If a key has no value, just press return.

Perhaps someday manufacturers will include plastic overlay cards with their products. Some may already. Until that time you can use one of these two methods to make all you want! **C**



```
 ____________________________
|                            |
|   SUPER EXPANDER           |
|                            |
|       __________           |
|   F1- |          |GRAPHIC   |
|       |          |          |
|   F2- |          |COLOR     |
|       |          |          |
|       |          |          |
|   F3- |          |DRAW      |
|       |          |          |
|   F4- |          |SOUND     |
|       |          |          |
|   F5- |          |CIRCLE    |
|       |          |          |
|   F6- |          |POINT     |
|       |          |          |
|       |          |          |
|   F7- |          |PAINT     |
|       |          |          |
|   F8- |__________|LIST+RTN  |
|                            |
|                            |
|____________________________|
```

FIGURE 2. Automated Method

Overlay Program

```
10 REM FUNCTION KEY OVERLAY PROGRAM
100 REM..........1.........2.........3
110 REM..123456789012345678901234567890
120 A1$="[CMDR A,SHIFT *28,CMDR S]"
125 A0$="[SHFT -,SPACE28,SHFT -]"
130 A2$="[SHFT -,SPACE6,CMDR A,SHIFT *10,CMDR S,SPACE10,
    SHFT -]"
140 A9$="[SHFT -,SPACE6,SHFT -,SPACE10,SHFT -,SPACE10,
    SHFT -]"
150 A3$="[SHFT -,SPACE6,CMDR Z,SHIFT *10,CMDR X,SPACE10,
    SHFT -]"
160 A4$="[CMDR Z,SHIFT *28,CMDR X]"
```

```
170 A5$="[SPACE20]"
180 A6$="[SPACE10]": AA$="[SPACE9]"
190 A7$="[SHFT -,SPACE3]"
200 A8$="[SPACE5,SHFT -]"
210 REM................................"
220 DIM TA$(8),TB$(8)
230 FOR I=1 TO 8:READ TA$(I):NEXT
240 DATA F1-,F2-,F3-,F4-,F5-,F6-,F7-,F8-
300 PRINT"[CLEAR]";
310 PRINT"FUNCTION[SPACE]KEY[SPACE]OVERLAY":PRINT
320 PRINT"[SPACE3]BY[SPACE]PAUL[SPACE]ZANDER":PRINT
330 PRINT"ENTER[SPACE]20-CHAR[SPACE]TITLE:":PRINT
340 INPUT T$:PRINT
350 T$=MID$(T$,1,20)
360 T1$=T$+MID$(A5$,1,20-LEN(T$))
370 PRINT:PRINT"ENTER[SPACE]10-CHAR[SPACE]KEY"
380 FOR I=1 TO 8
390 PRINT"FOR[SPACE]"TA$(I)"[SPACE]";:INPUT X$
400 X$=""+MID$(X$,1,10)
410 TB$(I)=X$+MID$(A6$,1,10-LEN(X$))
420 X$=""
430 NEXT I
440 PRINT
450 PRINT"READY[SPACE]PRINTER[SPACE]-[SPACE]HIT"
510 PRINT"ANY[SPACE]KEY[SPACE]TO[SPACE]CONTINUE"
520 GET A$:IF A$=""THEN 520
530 OPEN 4,4
540 PRINT#4,A1$:PRINT#4,A0$
550 PRINT#4,A7$+T1$+A8$
570 PRINT#4,A0$
580 PRINT#4,A2$
600 FOR I=1 TO 8
610 PRINT#4,A7$+TA$(I)+"[SHFT -,SPACE]"+AA$+"[SHFT -]
    "+TB$(I)+"[SHFT -]"
620 IF I<>8 THEN PRINT#4,A9$
630 IF I=2 OR I=6 THEN PRINT#4,A9$
640 NEXT
650 PRINT#4,A3$:PRINT#4,A0$
660 PRINT#4,A4$:PRINT#4
670 CLOSE 4
700 PRINT"PRINT[SPACE]AGAIN?[SPACE](Y/N)"
710 GET Q$:IF Q$=""THEN 710
720 IF Q$="Y"THEN 500
730 IF Q$<>"N"THEN 700
800 END
```

Solitaire

by Robert W. Baker

This popular card game is designed to run on the Commodore 64 or any PET or CBM computer.

The Rules of Solitaire

This program plays a solitaire game that's a variation of Klondike. One regular deck of 52 cards is used and 28 cards are dealt into seven rows (piles). The first row at the left has one card, the second two, and so on up to seven cards in the last row. The last card of each row is face up, all the rest are face down. On each row you may build in descending sequence; red on black or black on red. For example, you can play the ten of hearts on the jack of clubs or spades.

You can move the face-up cards in a row as a unit starting at any card. The top card being moved must fit in sequence and color with the card it is moved onto in the other row.

When you uncover a face-down card on a row, it will automatically be turned up. You are always entitled to have seven rows, and if one is entirely open you may put a king in the empty space.

Whenever you free an ace, move it to the ace foundations. On the aces you may build up in suit and sequence. To win the game you have to build each suit up to the king. A card must be the bottom card of a row to be played from the rows onto the ace foundations. Once played on the ace foundations, a card cannot be moved to help elsewhere.

The remaining 24 cards in the deck are used as the stock. Every third card may be turned up and the deck may be gone through any number of times. The top card is available for play to any row or the ace foundations. When the top card is played, the next card will then be available.

You win if you can build all four ace foundations up to the kings. You lose when you cannot make any further plays from the deck or between rows.

Running the Program

The program was written to run on any PET, CBM or Commodore 64 system. It does not use color graphics on the 64, since it was written to be compatible with previous systems. It cannot work on the VIC 20 with its limited 22-character display line. Normal and reverse fields are used to distinguish card colors and make it slightly easier to play without actual colors.

The game is controlled by keyboard commands in response to the main play prompt as follows: Press D to play the top cardfrom the deck to the aces or any row. Another prompt will ask for the A or a row number from 1 to 7. Press C to see the next available card in the deck. Press Q to quit the game and turn over all face-down cards.

Enter a row number from 1 to 7 to move cards from one row to another or to the ace foundations. If the row has more than one face-up card, you'll be asked to enter the card value to indicate the top card to be moved. Enter A for ace, J for jack, Q for queen, K for king, or the face number 2 to 10 for the desired card. Once the program knows what you want to move, it will ask for the desired place to move the cards: A for aces or a row number from 1 to 7.

Any invalid response or illegal play will be indicated with an error message and the main play prompt will return. You'll have to restart the entire play selection at that time. If the play command is accepted, you'll have to wait a few seconds while the screen is updated. Be careful not to hit the cursor controls when entering play commands since the entire screen is not redisplayed. If this should happen you'll just have to restart the game.

How the Program Works

Looking inside the game program, the F matrix keeps track of each card currently on the playing field. Each card is identified by a decimal value from 1 to 52: 1-13 are hearts, 14-26 are diamonds, 27-39 are spades, and 40-52 are clubs. Any card that is face down has 100 added to its card value. Thus, the program can quickly detect if a card is up or down, and can find its suit by dividing the card value by 13.

The S matrix is used to keep track of the ace foundations for each suit. The D matrix is the actual deck of 52 cards. The S$ matrix contains the graphic suit characters for each of the four suits. There are comments scattered throughout the program so you can get a feel for what is going on where. Have fun!

C

Solitaire

```
1000 REM ******************************
1010 REM
1020 REM         S O L I T A R E
1030 REM
1040 REM  BY: ROBERT BAKER, ATCO, NJ
1050 REM
1060 REM ******************************
1070 PRINT"[CLEAR,DOWN10]SHUFFLING CARDS FOR A GAME OF SOLITARE!"
1090 PRINT: PRINT: PRINT: PRINT"    I'LL BE READY IN A FEW SECONDS"
1100 FOR X=1 TO VAL(RIGHT$(TI$,2))
1110 R=RND(1): NEXT X
1120 DIM F(7,18),S(4),D(52),S$(4)
1130 S$(1)="[SHIFT S]":S$(2)="[SHIFT Z]":S$(3)="[SHIFT A]":S$(4)="
     [SHIFT X]"
1140 REM SUIT#1 = HEARTS
1150 REM SUIT#2 = DIAMONDS
1160 REM SUIT#3 = SPADES
1170 REM SUIT#4 = CLUBS
1180 QM$="  ?"+CHR$(157)+CHR$(157)+CHR$(157)
1190 FOR X=0 TO 7: FOR Y=0 TO 18: F(X,Y)=0: NEXT Y,X
1200 FOR X=0 TO 4: S(X)=0: NEXT X
1210 FOR X=0 TO 52: D(X)=0: NEXT X
1220 REM *** SHUFFLE CARDS IN DECK
1230 FOR X=1 TO 52
1240 R=INT(RND(1)*52+1): IF D(R)>0 THEN 1240
1250 D(R)=X: NEXT X
1260 REM *** DEAL CARDS INTO PILES
1270 R=52: FOR X=1 TO 7: FOR Y=1 TO X
1280 F(X,Y)=D(R)+100
1290 D(R)=0: R=R-1: NEXT Y
1300 F(X,X)=F(X,X)-100: NEXT X
1310 REM *** DISPLAY EVERYTHING
1320 C=3: GOSUB 2730
1330 REM *** COMMAND INPUT
1340 PRINT"[HOME,DOWN21]";
1360 L=3: GOSUB 3080
```

```
1370 IF S(1)+S(2)+S(3)+S(4)<>130 THEN 1390
1380 PRINT"CONGRATULATIONS,  Y O U   W I N  !": GOTO 1510
1390 PRINT"D=DECK,ROW#1-7,C=CARD,Q=QUIT; PLAY=";QM$;: INPUT P$:
     P=VAL(P$)
1400 IF (P>7) OR (P<0) THEN 2360
1410 IF P>0 THEN 1840
1420 IF P$="C" THEN GOSUB 2900: GOTO 1340: REM NEXT CARD
1430 IF P$<>"Q" GOTO 1550
1440 REM *** QUITTER!
1450 FOR X=1 TO 7: FOR Y=1 TO 18
1460 IF F(X,Y)>100 THEN F(X,Y)=F(X,Y)-100
1470 NEXT Y,X
1480 GOSUB 2830
1490 L=3: GOSUB 3080
1500 PRINT"SORRY, BETTER LUCK NEXT TIME !!!"
1510 PRINT"WANT TO PLAY AGAIN (Y/N) ? "
1520 GET P$: IF P$="Y" THEN RUN
1530 IF P$<>"N" THEN 1520
1540 END
1550 IF P$<>"D" GOTO 2360
1560 REM *** FROM DECK TO ...
1570 IF D(1)=0 THEN 2370
1580 V=D(C): S1=INT((D(C)-1)/13)+1
1590 IF V>13 THEN V=V-13: GOTO 1590
1600 L=1: GOSUB 3060
1610 PRINT"FROM DECK TO (A=ACES, ROW#1-7)";QM$;: INPUT R$
1620 IF R$<>"A" THEN 1700
1630 REM *** DECK TO ACES
1640 IF S1<>(D(C)+12)/13 THEN 1670
1650 IF S(S1)>0 THEN 2370
1660 GOTO 1680
1670 IF D(C)<>S(S1)+1 THEN 2370
1680 S(S1)=D(C): X=S1: GOSUB 2420: GOSUB 3130: GOTO 1340
1690 REM *** DECK TO ROW
1700 R=VAL(R$)
1710 Y=1: IF (R<1) OR (R>7) THEN 2360
1720 IF Y>18 THEN 2370
1730 IF F(R,Y)<>0 THEN Y=Y+1: GOTO 1720
1740 IF Y>1 THEN 1770
1750 IF V=13 THEN 1820
1760 GOTO 2370
1770 V1=F(R,Y-1)
1780 IF V1>13 THEN V1=V1-13: GOTO 1780
1790 IF V<>V1-1 THEN 2370
1800 S2=INT((F(R,Y-1)-1)/26): S1=INT((S1-1)/2)
1810 IF S1=S2 THEN 2370
1820 F(R,Y)=D(C): GOSUB 3180: GOSUB 3130: GOSUB 2830: GOTO 1340
```

```
1830 REM *** FROM ROW TO ...
1840 Y=0: IF F(P,1)=0 THEN 2370
1850 REM *** SINGLE CARD IN ROW?
1860 Y=Y+1: IF Y>18 THEN 2370
1870 Y2=F(P,Y): IF Y2>100 THEN 1860
1880 IF F(P,Y+1)<>0 THEN 1920
1890 IF Y2>13 THEN Y2=Y2-13: GOTO 1890
1900 GOTO 2030
1910 REM *** FROM WHAT CARD IN ROW?
1920 L=1: GOSUB 3060
1930 PRINT"FROM ROW";P;"CARD (A,2-10,J,Q,K)";QM$;: INPUT Y$:
     Y1=VAL(Y$)
1940 IF Y$="A" THEN Y1=1
1950 IF Y$="J" THEN Y1=11
1960 IF Y$="Q" THEN Y1=12
1970 IF Y$="K" THEN Y1=13
1980 IF (Y1=0) OR (Y1>13) THEN 2360
1990 IF Y>18 THEN 2370
2000 Y2=F(P,Y): IF Y2>100 THEN Y=Y+1: GOTO 1990
2010 IF Y2>13 THEN Y2=Y2-13: GOTO 2010
2020 IF Y1<>Y2 THEN Y=Y+1: GOTO 1990
2030 R=F(P,Y): L=1: GOSUB 3060
2040 PRINT"FROM ";: GOSUB 2520
2050 PRINT" ROW";P;"TO (A=ACES,ROW#1-7)";QM$;: INPUT A$
2060 REM *** FROM ROW/CARD TO ...
2070 S1=INT((F(P,Y)-1)/13)+1
2080 IF A$<>"A" THEN 2180
2090 REM *** FROM ROW/CARD TO ACES
2100 IF F(P,Y+1)>0 THEN 2370
2110 IF S1<>(F(P,Y)+12)/13 THEN 2140
2120 IF S(S1)>0 THEN 2370
2130 GOTO 2150
2140 IF F(P,Y)<>S(S1)+1 THEN 2370
2150 S(S1)=F(P,Y): F(P,Y)=0: IF F(P,Y-1)>100 THEN F(P,Y-1)=F
     (P,Y-1)-100
2160 GOSUB 3180: GOSUB 2830: X=S1: GOSUB 2420: GOTO 1340
2170 REM *** FROM ROW/CARD TO ROW
2180 Q=VAL(A$)
2190 Z=1: IF (Q<1) OR (Q>7) THEN 2360
2200 IF Z>18 THEN 2370
2210 IF F(Q,Z)<>0 THEN Z=Z+1: GOTO 2200
2220 IF Z>1 THEN 2250
2230 IF Y2=13 THEN 2300
2240 GOTO 2370
2250 V1=F(Q,Z-1)
2260 IF V1>13 THEN V1=V1-13: GOTO 2260
```

```
2270 IF Y2<>V1-1 THEN 2370
2280 S2=INT((F(Q,Z-1)-1)/26): S1=INT((S1-1)/2)
2290 IF S1=S2 THEN 2370
2300 IF F(P,Y-1)>100 THEN F(P,Y-1)=F(P,Y-1)-100
2310 F(Q,Z)=F(P,Y): F(P,Y)=0
2320 Y=Y+1: Z=Z+1
2330 IF F(P,Y)<>0 THEN 2310
2340 GOSUB 3180: GOSUB 2830: GOTO 1340
2350 REM *** ERRORS!
2360 PRINT"[RVS]INVALID RESPONSE!": GOTO 2380
2370 PRINT"[RVS]ILLEGAL PLAY!"
2380 T=TI
2390 IF(TI-T)<50 GOTO 2390
2400 GOTO 1340
2410 REM *** DISPLAY ACES
2420 PRINT"[HOME,DOWN4]";
2430 FOR X1=1 TO X: PRINT"[DOWN2]";: NEXT X1
2440 IF (S(X)=0) AND (X>2) THEN PRINT"--";S$(X): RETURN
2450 IF S(X)=0 THEN PRINT"[RVS,SPACE2]";S$(X);"[RVOFF]": RETURN
2460 R=S(X): GOSUB 2520: PRINT: RETURN
2470 REM *** DISPLAY CARDS IN PILES
2480 R=F(X,Y)
2490 IF R=0 THEN PRINT"   ";: RETURN
2500 IF R>100 THEN PRINT"XXX";: RETURN
2510 REM *** PRINT CARD
2520 R1=R
2530 IF R1>13 THEN R1=R1-13: GOTO 2530
2540 IF R<27 THEN PRINT"[RVS]";
2550 ON R1 GOTO 2570,2580,2590,2600,2610,2620
2560 ON R1-6 GOTO 2630,2640,2650,2660,2670,2680,2690
2570 PRINT" A";: GOTO 2700
2580 PRINT" 2";: GOTO 2700
2590 PRINT" 3";: GOTO 2700
2600 PRINT" 4";: GOTO 2700
2610 PRINT" 5";: GOTO 2700
2620 PRINT" 6";: GOTO 2700
2630 PRINT" 7";: GOTO 2700
2640 PRINT" 8";: GOTO 2700
2650 PRINT" 9";: GOTO 2700
2660 PRINT"10";: GOTO 2700
2670 PRINT" J";: GOTO 2700
2680 PRINT" Q";: GOTO 2700
2690 PRINT" K";
2700 R9=INT((R-1)/13)+1
2710 PRINT S$(R9);"[RVOFF]";: RETURN
2720 REM *** DISPLAY ACES & ROWS
```

```
2730 PRINT"[CLEAR]ROWS  -1-  -2-  -3-  -4-  -5-  -6-  -7-"
2740 PRINT CHR$(17);CHR$(17);CHR$(192);CHR$(192);CHR$(192);CHR$
     (192);CHR$(238)
2750 PRINT"ACES";
2760 FOR XX=1 TO 8: PRINT CHR$(221);CHR$(17);CHR$(157);: NEXT XX
2770 PRINT CHR$(221)
2780 PRINT CHR$(192);CHR$(192);CHR$(192);CHR$(192);CHR$(253)
2790 FOR X=1 TO 4: GOSUB 2420: NEXT X
2800 GOSUB 2830
2810 GOTO 2960
2820 REM *** UPDATE ROW DISPLAY
2830 PRINT"[HOME,DOWN2]";
2840 FOR Y=1 TO 18
2850 Y9=Y-11: IF Y<12 THEN Y9=1
2860 PRINT TAB(4+((Y9-1)*5));
2870 FOR X=Y9 TO 7: PRINT SPC(2);: GOSUB 2480
2880 NEXT X: PRINT: NEXT Y: RETURN
2890 REM *** NEXT 3RD CARD IN DECK
2900 IF D(1)=0 THEN 2960
2910 C=C+3
2920 IF C>24 THEN C=3
2930 IF D(C)+D(C-1)+D(C-2)=0 THEN C=3
2940 IF D(C)=0 THEN C=C-1: GOTO 2940
2950 REM *** UPDATE DECK DISPLAY
2960 PRINT"[HOME,DOWN16]DECK[DOWN]"
2980 PRINT"                           ": REM  27 SPACES
2990 PRINT"[UP]";
3000 IF D(1)=0 THEN PRINT"   ";: GOTO 3020 :REM 3 SPACES IN PRINT
3010 R=D(C): GOSUB 2520
3020 X=0: FOR Y=1 TO 24: IF D(Y)<>0 THEN X=X+1: NEXT Y
3030 PRINT TAB(10);"(";X;"CARDS LEFT )"
3040 RETURN
3050 REM *** BACK UP LINES THEN CLEAR
3060 FOR L1=1 TO L: PRINT"[UP]";: NEXT L1
3070 REM *** BLANK LINES!
3080 FOR L1=1 TO L
3090 PRINT"                                       ": REM 39 SPACES
3100 NEXT L1
3110 FOR L1=1 TO L: PRINT"[UP]";: NEXT L1: RETURN
3120 REM *** REMOVE CARD FROM DECK & DISP
3130 FOR X=C TO 24: D(X)=D(X+1): NEXT X
3140 IF D(1)=0 THEN 3170
3150 C=C-1: IF C<1 THEN C=3
3160 IF D(C)=0 THEN C=C-1: GOTO 3160
3170 GOSUB 2960: RETURN
3180 PRINT"[RVS]PLEASE WAIT WHILE I FIX THE CARDS !": RETURN
```

Two Cartoons for the VIC 20

by John Stillwell

Using programmable characters, you can create cartoons that move on your unexpanded VIC 20.

For the last year and a half I have worked as a cameraman for a local television show in Madison, Wisconsin. Every month the show features a different fantasy role-playing game. One month it may be "Dungeons and Dragons" and the next "Top Secret." One thing that we lacked was something regular along the line of graphics. The average show consisted of a group of people acting out an adventure with few or no props. Knowing that I was a computer enthusiast, the producer asked me to come up with a series of cartoons to liven up the show. In the past, we had flashed humorous messages on the bottom of the screen. But he thought computer animation superimposed on the gamers would be a much better eyecatcher. Below are programs for creating two of the cartoons that I wrote for the show.

When I started on this project, I intended to make one cartoon for every subject the show might touch. One of the subjects was science fiction. I didn't have to think very long before I made the obvious choice. For every computer there is a program that displays a picture of the star ship Enterprise. It's become a status symbol. My version of this classic idea has the Enterprise flying over a planet. If you want the ship to fly by automatically, then change line 470 into a delay loop.

The second cartoon premiered on a "Boot Hill" adventure. The gunslingers demanded to see the sheriff. Who was I to refuse them? The animation that appeared over the air was not quite what they expected.

Both programs work on the unexpanded VIC 20. Line 10 sets the pointers so that the program won't write over the character set. Lines 20 to 70 set up the new character set. The final pictures are made up of several characters. The last part of the program puts these characters together like the pieces of a puzzle. Then individual pieces are replaced giving the illusion of motion. In the Enterprise program, this is accomplished by lines 450 to the end. While in the Sheriff program, this starts at line 370. With both programs, when a picture appears, push any key to start the action.

If you do not want to type these programs in, send me $3 and I will be very happy to send you a tape with them on. My address is 5018 Marathon Drive, Madison, Wisconsin 53705. **C**

Sheriff

```
10 POKE 36879,27:X=27:POKE 52,X:POKE 56,X:POKE 51,PEEK(55)
   :CLR
20 CS=256*PEEK(52)+PEEK(51)
30 FOR I=CS TO CS+511:POKE I,PEEK(I+32768-CS):NEXT
40 READ X:IF X<0 THEN 60
50 FOR I=X TO X+7:READ J:POKE I,J:NEXT:GOTO 40
60 POKE 36869,255
70 GOTO 370
80 FOR I=1 TO 50:NEXT:RETURN
90 DATA 7168,0,0,0,0,0,0,1,1
100 DATA 7176,0,0,15,16,16,240,16,255
```

```
110 DATA 7184,0,0,240,8,8,124,130,255
120 DATA 7192,27,0,56,2,12,0,15,240
130 DATA 7200,120,120,120,80,16,32,192,124
140 DATA 7208,3,12,48,67,68,72,72,40
150 DATA 7216,8,5,2,2,130,130,130,130
160 DATA 7224,130,1,81,241,81,17,17,17
170 DATA 7232,62,80,86,3,7,3,3,3
180 DATA 7240,130,130,130,130,135,255,151,32
190 DATA 7248,17,17,17,14,22,254,71,39
200 DATA 7256,3,3,3,0,0,0,0,0
210 DATA 7264,64,128,135,133,133,132,132,132
220 DATA 7272,23,15,8,8,4,132,130,66
230 DATA 7280,0,0,0,0,0,0,7,7
240 DATA 7288,252,252,253,253,255,255,255,238
250 DATA 7296,68,248,248,240,224,240,254,126
260 DATA 7304,0,0,0,0,7,3,3,3
270 DATA 7312,15,48,192,7,24,224,0,0
280 DATA 7320,48,24,14,15,27,24,0,0
290 DATA 7328,4,4,12,31,63,0,0,0
300 DATA 7336,1,27,62,31,11,0,0,0
310 DATA 7344,8,12,14,15,15,0,0,0
320 DATA 7352,0,0,2,7,15,28,6,3
330 DATA 7360,0,0,16,15,15,12,8,8
340 DATA 7368,0,0,8,15,15,30,50,32
350 DATA 7376,0,2,124,31,15,4,0,0
360 DATA 7424,0,0,0,0,0,0,0,0,-1
370 PRINT"[CLEAR,RIGHT9,DOWN15]@AB[DOWN,LEFT2]CD[DOWN,
    LEFT3]EFG[DOWN,LEFT3]HIJ[DOWN,LEFT3]KLM[DOWN,LEFT3]
    NOP[UP3]"
380 GET A$:IF A$=""THEN 380
390 PRINT"[RIGHT9]Q[UP,LEFT2]ZR"
400 FOR I=1 TO 2000:NEXT
410 FOR X=1 TO 3:PRINT"[UP,RIGHT8]S":GOSUB 80
420 PRINT"[UP,RIGHT8]T":GOSUB 80
430 PRINT"[UP,RIGHT8]U":GOSUB 80
440 PRINT"[UP,RIGHT8]V":GOSUB 80
450 PRINT"[UP,RIGHT8]W":GOSUB 80
460 PRINT"[UP,RIGHT8]X":GOSUB 80
470 PRINT"[UP,RIGHT8]Y":GOSUB 80
480 PRINT"[UP,RIGHT8]Z":GOSUB 80:GOSUB 80:GOSUB 80
490 NEXT X
500 PRINT"[RIGHT9]H[UP,LEFT2,SPACE]E":GOTO 380
```

Enterprise

```
140 POKE 36879,27:X=PEEK(56)-2:POKE 52,X:POKE 56,X
    :POKE 51,PEEK(55):CLR
150 CS=256*PEEK(52)+PEEK(51)
160 FOR I=CS TO CS+511:POKE I,PEEK(I+32768-CS):NEXT
170 READ X:IF X<0 THEN 310
180 FOR I=X TO X+7:READ J:POKE I,J:NEXT:GOTO 170
310 POKE 36869,255
315 GOTO 700
333 FOR I=1 TO 50:NEXT:RETURN
340 DATA 7168,0,0,0,0,0,3,1,0
350 DATA 7176,0,0,0,0,0,255,255,0
360 DATA 7184,0,0,48,124,130,255,255,130
370 DATA 7192,0,0,0,0,0,255,255,192
380 DATA 7200,0,31,40,40,31,128,0,128
390 DATA 7208,0,255,0,0,255,96,96,96
400 DATA 7216,0,255,0,1,255,0,0,0
410 DATA 7224,240,255,6,196,252,0,0,0
420 DATA 7232,124,16,0,0,0,0,0,0
430 DATA 7240,32,24,7,12,31,31,12,7
440 DATA 7248,64,48,255,0,128,128,3,252
450 DATA 7256,96,96,224,127,1,6,248,0
460 DATA 7264,0,0,0,0,128,0,0,0
470 DATA 7272,0,1,15,127,255,255,255,255
480 DATA 7280,0,0,0,0,3,15,31,127
490 DATA 7288,31,241,241,241,224,224,192,128
500 DATA 7296,255,254,254,254,254,252,252,248
510 DATA 7304,0,240,14,1,0,0,0,0
520 DATA 7312,0,0,0,192,56,62,63,31
530 DATA 7320,0,3,4,8,16,32,64,128
540 DATA 7328,255,63,63,127,255,255,255,255
550 DATA 7336,254,252,252,254,254,255,131,207
560 DATA 7344,0,0,0,0,0,224,248,240
570 DATA 7352,120,56,48,16,0,0,0,0
580 DATA 7360,0,0,0,0,1,1,7,0
590 DATA 7368,143,95,127,63,255,255,255,255
600 DATA 7376,224,248,252,254,255,255,255,255
605 DATA 7384,1,2,4,8,8,16,16,32
```

NOTE: In line 710 the [\] should be entered as bracket, slash, bracket.

```
610 DATA 7392,3,7,15,15,15,15,31,31
615 DATA 7400,255,255,255,255,255,255,255,255
620 DATA 7408,223,223,254,254,254,252,252,252
625 DATA 7416,224,128,0,0,0,0,0,0
630 DATA 7424,127,127,127,127,15,15,7,3
635 DATA 7432,240,248,252,254,254,255,255,255
640 DATA 7448,0,0,0,0,0,128,192,224
650 DATA-1
700 PRINT"[CLEAR,BLUE]"
710 PRINT"[HOME,DOWN20,RIGHT6]NMOPQR[DOWN,LEFT7]STUVWXYZ#
    [DOWN,LEFT10][\]^[RVS,SPACE3,RVOFF,SPACE]]![UP4]"
714 GET A$:IF A$=""THEN 714
720 GOSUB 930:PRINT"[BLACK,RIGHT19]";
722 PRINT"@";:GOSUB 1000:PRINT"@A[LEFT]";:GOSUB 1000
    :PRINT"@AB[DOWN,LEFT]H[UP,LEFT2]";:GOSUB 1000
724 PRINT"@ABC[DOWN,LEFT2]HI[UP,LEFT3]";:GOSUB 1000
    :PRINT"@ABCD[DOWN,LEFT3]HIJ[UP,LEFT4]";:GOSUB 1000
726 PRINT"@ABCDE[DOWN,LEFT4]HIJK[UP,LEFT5]";:GOSUB 1000
    :PRINT"@ABCDEF[DOWN,LEFT5]HIJKL[UP,LEFT5]";:GOSUB 1000
732 FOR K=13 TO 1 STEP-1:GOSUB 930:FOR J=1 TO K
    :PRINT"[RIGHT]";:NEXT J:GOSUB 900:NEXT K
735 GOSUB 930:PRINT"ABCDEFG[DOWN,LEFT6]HIJKL[RVS,SPACE2,
    UP,LEFT,SPACE]":GOSUB 1001:GOSUB 930
    :PRINT"BCDEFG[DOWN,LEFT6]HIJKL[RVS,SPACE2,UP,LEFT,
    SPACE]"
736 GOSUB 1001:GOSUB 930:PRINT"CDEFG[DOWN,LEFT5]IJKL[RVS,
    SPACE2,UP,LEFT,SPACE]":GOSUB 1001:GOSUB 930
    :PRINT"DEFG[DOWN,LEFT4]JKL[RVS,SPACE2,UP,LEFT,SPACE]"
737 GOSUB 1001:GOSUB 930:PRINT"EFG[DOWN,LEFT3]KL[RVS,
    SPACE2,UP,LEFT,SPACE]":GOSUB 1001:GOSUB 930
    :PRINT"FG[DOWN,LEFT2]L[RVS,SPACE2,UP,LEFT,SPACE]"
    :GOSUB 1001
738 GOSUB 930:PRINT"G[DOWN,LEFT,RVS,SPACE2,UP,LEFT,SPACE]"
    :GOSUB 1001:GOSUB 930:PRINT"[RVS,SPACE]"
750 GOTO 714
900 PRINT"[LEFT]@ABCDEFG[DOWN,LEFT6]HIJKL[RVS,SPACE,UP,
    SPACE]":GOSUB 1001:RETURN
930 PRINT"[HOME,DOWN15]";:RETURN
1000 PRINT"[LEFT2]";
1001 FOR I=1 TO 100:NEXT:RETURN
```

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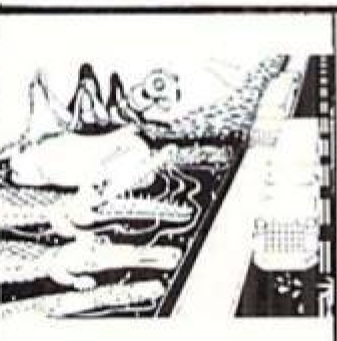
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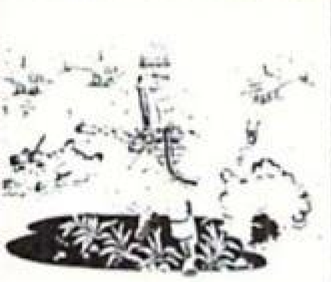
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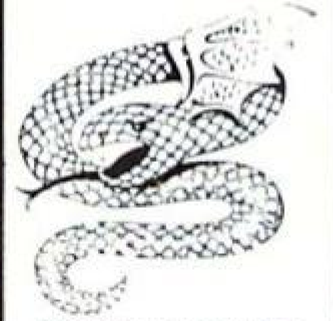
SNAKE OUT

CRICKET - From the company that brought you Asteroidz, Munchman and a host of other blockbusters. We now present CRICKET. This is a challenging game with a cast of characters you will love and hate. All you have to do is get Cherp from one side of the road to the river and then across the river. Not so fast though. First you have to figure out how to dodge the traffic and get to the center. Then how are you going to get across the river? Look here comes a log — even a turtle. Hitch a ride across the river and jump from one to the other. Keep a sharp eye out for Ade the Gator. He loves to have crickets for lunch. How many times can you get across the road and river. You will have to work as fast as you can. Time limit and bonus. You will find this game addictive and challenging and it will entertain you with hours of fun and enjoyment. **$14.95**

BUG BLAST - If you think Centipede was fun — look out for BUG BLAST. A new and fast action arcade game with realistic smooth action, quality hi-res graphics and trouble. Its very calm as the first wave attacks. Only a few bugs to kill. Just shoot thru the cactus and wipe them out. After a few attacks you feel you have everything under control. Now the attacks really start. Those protection areas have to go. Blast away. Will they ever stop? OK — the BUGS got me this time. Now its my turn, Just one more time — BUG BLAST — Now its your turn to get even. **$14.95**

BOMB'S AWAY - Can you stop him? The crazy bomber drops the bombs from the top of the screen. You get 3 buckets to catch them. Before you know it bombs are falling so fast you wonder when he will stop. Just when you think you have him under control your bucket gets smaller. Is your hand quicker than your eye? **Special $9.95**

PARATROOPER - You are the only one left to stop them. The sky is full of enemy choppers. Paratroopers keep dropping into your area with non-stop barrage of enemy troops. They are out to destroy you. This new game is an unbeatable blend of arcade action and quick thinking strategy. You must make every shot count — don't be to fast on the trigger. Every time you hit a chopper or paratrooper you get extra points. Wait until you see the climax of this game — you won't believe it! This is a multiple skill level game with razor-sharp graphics and sound. **$19.95**

MOW - Get ready for the fast and furious action of the craziest mower you have ever seen. How much grass can you cut? Joystick moves your mower around as fast as you dare. Watch out for granny's dafodils and grandpa's radio antenna. **$14.95**

COSMIC CRUZER - Bring the coin-op game into your VIC. 3 Scenarios. Your Cruzer moves over a mountainous landscape & into a tunnel of surface - to - air missle, silos and ground - to - air weapons. If you can make it in and out of the tunnel you fly into the asteroid field. Drop bombs and fire missiles at the fuel dumps to keep your fuel supply up. If you are really good you can get to the base and try, to destroy it. We don't know of any one that has hit the base yet. Maybe you will be the 1st. Cosmic Cruzer is a fun filled magnificently rendered home video game that will last for months of challenge. Highly addicting. Hi-Res Graphics, Color & Sound. **SPECIAL PRICE - $14.95**

SPACE PAK - Can you survive? 3 space games with the sights and sounds of arcade games. The excitement builds as the action is un-ending. Blast away at everything in sight. The alien attacks will stop at nothing to destroy you. Prepare for battle, there is no escape, unless you can help. Can you survive? Hi-Res, Color, Graphic & Sound. Joystick or keyboard. **$19.95**

ALIEN INVASION - Invaders from space are attacking your home planet. Hurry and man your lasers and prepare your robot forces for the inevitable attack of the Alien Invaders. The excitment builds as you command a battery of missile bases in a bunker. Each invader has a laser aimed right at you. Will they ever stop. Only you can save the Galaxy. You can compete with 4 people in the solar system. There are 20 levels of play. If you destroy the Aliens in the correct order you will receive bonus points. Can you get the top score? **$14.95**

TARGET COMMAND - The whole West Coast is being bombarded and only you can save it. You are at the controls of the missile launcher and hold the destiny of our country in your hands. It takes a cool head, not hand and fast reflexes to zap those missiles right out of the air. Get ready to pulverize — atomize and vaporize them. Oh, my God, those warheads are heading right for our ammo dumps. They are everywhere. NO ONE CAN SAVE US — EXCEPT YOU. You must move your laser into position and fire as fast as you dare. Time limit with arcade style excitement. Protect your ammo at all costs. 10 levels of play. **$14.95**

SNAKEOUT - Slip your snake into position and score by chomping the blocks. Watch the way you slither because your escape routes get smaller. 2 Bonus games included. **$14.95**

HEAD-ON - Please do not buy this game if you are the type that says "I'll play it just one more time". Players have been known to start playing HEAD ON at 8:30 p.m. and at 2 a.m., wonder where the time went? Have you ever tried to explain to someone why you played a game for five and a half hours. We know of no remedy for the addiction to HEAD ON except to beat the VIC on level 9. No one has done it, YET, will you? We think not. Move your car as fast as you can dare around the tracks. You get 3 cars and MUST avoid the computer car. Points for the most dots covered. Bonus cars, nine levels of play. **$14.95**

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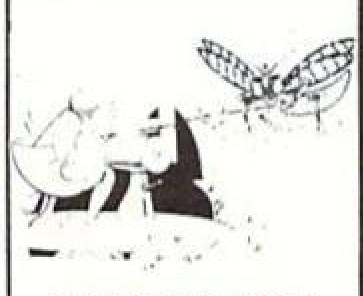
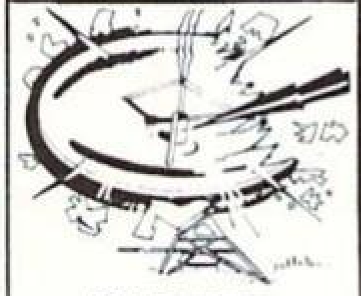

BUG BLAST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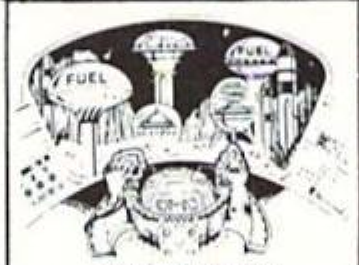
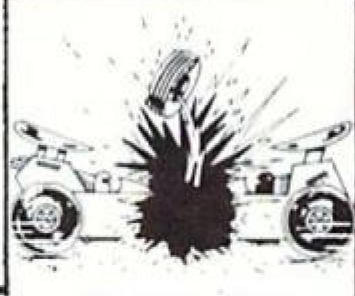

COSMIC CRUZER

SPACE PAK


HEAD ON

Hexterminator II

by George Currie

Type and save this game program for the unexpanded VIC 20.

You have just defeated the evil planet HEX. You must keep the little Hexcans from escaping past you. These Hexcans can hurt you only by hitting you. They come down either diagonally or straight. You must shoot the Hexcans as quickly as possible because the higher up you shoot them the more points you get. If you let one go by you lose points.

There is only one thing that keeps you from totally eradicating their race—the HEXTERMINATOR ship. He comes out every once in a while at the top and attempts to blast you. He will always shoot you if you are under him, and the higher your score the greater your chance of being blasted. You can't shoot him (at least it's never been done), because he is too quick. But, because he moves two spaces every time, there is an escape from him.

You have three lives. Press F-1 for a one-player game, F-3 for two players, F-5 for the top nine high scores. The cursor keys move you and the letter Z fires your ray. **C**

Hexterminator II

```
0 REM     HEXTERMINATAR II       MCMLXXXIII HEX
4 DEF FN L(P)=-(P=23 AND A<8185)+(P=31 AND A>8164)
  :DEF FN K(Z)=Z/3500:GOTO 1000
5 PRINT T$(G)"[WHITE]"SC(G)"[LEFT,SPACE2]":RETURN
6 PRINT T$(G)"[WHITE,DOWN]"LEFT$(L$,L(G))"[SPACE2]":RETURN
7 PRINT"[HOME,RIGHT8,CYAN]"HS%(1):RETURN
8 A$="[SPACE5]":B$="[SPACE4]":IF P2=1 THEN A$="[SPACE]00
  [SPACE2]":B$="###"
9 PRINT"[HOME,WHITE,SPACE]00[SPACE2]"TAB(16)A$
  :PRINT"[HOME,DOWN,SPACE]###"SPC(13)B$:RETURN
100 V=36878:S2=36877:S1=36875:B=0:GOSUB 450:G=1:P2=0
    :A=8175:POKE A,35:IF P=47 THEN P2=1
120 FOR T=1 TO 2:SC(T)=0:L(T)=3:NEXT:L$="[SPACE]###"
    :GOSUB 8:GOSUB 6:GOTO 250
150 P=PEEK(197):POKE A,32:A=A+FN L(P):POKE A,35:POKE A+Q,1
    :ON-(P=33)-2*(P<>33)GOTO 200,255
200 D=A:F=D:X=.:POKE V,15:SS=250
203 X=X+1:IF X=20 THEN X=0:GOTO 225
205 SS=SS-1:POKE S2,SS:F=F-22:IF F=R THEN SC(G)=SC(G)+33
    :R=.:BB=1:GOSUB 5:GOTO 220
207 POKE F+Q,2:POKE F,37:GOTO 203
220 POKE F,38:POKE S1,220:POKE S2,190:FOR T=10 TO 15
    :POKE V,T:FOR I=1 TO 30:NEXT I,T
225 POKE S1,.:POKE S2,.:FOR T=D TO F+22 STEP-22:D=D-22
    :POKE D,32:NEXT:ON BB+1 GOTO 255,250
```

```
250 BB=0:Z=SC(G):IF RND(1)<FN K(Z)THEN B=2:GOTO 400
251 CH=36:LI=8185:MI=.:IF RND(1)>.5 THEN R=7746+INT(RND(1
    )*22)+1:U=22:CO=4:GOTO 255
253 U=23:W=INT(RND(1)*20)+1:R=E%(W):CO=5:IF W>10 THEN U=21
255 POKE R,32:R=R+U:SC(G)=SC(G)-1:IF R>LI OR R<MI THEN GO
    SUB 5:GOTO 250
260 POKE R+Q,CO:POKE R,CH:IF R=A THEN 300
263 IF A-R=418 THEN 420
265 GOTO 150
300 GOSUB 5:POKE A,39:POKE S2,210:FOR T=15 TO 0 STEP-1
    :POKE V,T:FOR I=1 TO 75:NEXT I,T:POKE S2,.
305 L(G)=L(G)-1:IF L(G)=.THEN 355
320 IF G=2 THEN G=1:GOTO 340
325 IF G=1 AND P2=1 THEN G=2
340 PRINT"[HOME,DOWN9,RIGHT6,WHITE]PLAYER"G"UP"
    :FOR T=1 TO 7500:NEXT
350 GOSUB 450:GOSUB 6:A=8175:B=.:POKE A,35:GOTO 250
355 DP=1:IF L(1)=.AND P2=.THEN FL=1
357 IF P2=1 AND L(2)=.THEN DP=2:FL=1
360 PRINT"[HOME,DOWN9,RIGHT2]PLAYER"DP"GAME[SPACE]OVER"
    :FOR T=1 TO 5000:NEXT:IF FL=.THEN G=2:GOTO 350
370 FOR J=1 TO G:FOR T=1 TO 9:IF SC(J)<HS%(T)THEN NEXT
373 FOR I=9 TO T STEP-1:HS%(I+1)=HS%(I):NEXT:HS%(T)=SC(J)
    :NEXT J:FL=.:GOTO 520
400 CH=40:CO=3:LI=7767:MI=7746:IF RND(1)>.5 THEN R=7746
    :U=2:GOTO 255
403 R=7767:U=-2:GOTO 255
420 SS=235:POKE V,15:FOR T=R+22 TO A STEP 22:SS=SS-1
    :POKE S2,SS:POKE T,37:POKE T+Q,7:NEXT:GOTO 300
450 FOR T=7746 TO 8185:POKE T,32:NEXT:RETURN
520 GOSUB 7:GOSUB 450:A$="[HOME,DOWN14]"
    :PRINT"[HOME,DOWN4,WHITE,SPACE5]HIGH[SPACE]SCORES
    [DOWN]"
523 FOR T=1 TO 9:PRINT LEFT$(A$,T+6)SPC(6)T"-"HS%(T):NEXT
    :FOR T=1 TO 7000:NEXT:GOSUB 450:GOTO 630
604 FOR T=1 TO 9:HS%(T)=500:NEXT:DIM E%(20):X=.:G=1
    :T$(1)="[HOME]":T$(2)="[HOME,RIGHT16]"
610 FOR T=7746 TO 7944 STEP 22:X=X+1:E%(X)=T:NEXT
    :FOR T=7767 TO 7965 STEP 22:X=X+1:E%(X)=T:NEXT
620 GOSUB 8:T=0:Q=30720:FOR T=7724 TO 7745 STEP 2
    :POKE T,41:POKE T+Q,7:POKE T+1,42:POKE T+1+Q,7:NEXT
627 GOSUB 7
630 PRINT"[HOME,DOWN4,WHITE,SPACE3]HEXTERMINATAR[SPACE]II"
    :PRINT"[DOWN2]F1[SPACE]=[SPACE]START[SPACE]1[SPACE]
    PLAYER[DOWN,SPACE3]F3[SPACE]=[SPACE]START[SPACE]2
    [SPACE]PLAYER"
```

```
633 PRINT"[HOME,DOWN11]F5[SPACE]=[SPACE]HIGH[SPACE]SCORES"
    :PRINT"[HOME,DOWN13]USE[SPACE]CRSR[SPACE]KEYS[SPACE]
    TO[SPACE]MOVE[DOWN,SPACE9]Z=FIRE
635 P=PEEK(197):ON-(P=39)-2*(P=47)-3*(P=55)GOTO 100,100,
    520
645 GOTO 635
1000 POKE 56,28:POKE 36869,255:FOR I=7168 TO 7679
     :POKE I,PEEK(I+25600):NEXT
1010 FOR T=1 TO 8:READ X:FOR L=X TO X+7:READ Y:POKE L,Y
     :NEXT:NEXT:PRINT"[CLEAR]":POKE 36879,15:GOTO 604
1015 DATA 7448,24,36,24,24,102,60,102,102,7456,68,130,124,
     214,124,68,56,198
1020 DATA 7464,24,24,24,24,24,24,24,24,7472,122,224,2,234,
     213,123,146,202
1025 DATA 7480,8,42,20,34,85,34,8,62,7496,0,255,104,107,8,
     107,104,255
1030 DATA 7488,129,90,60,90,60,36,90,60,7504,0,255,93,235,
     247,235,93,255
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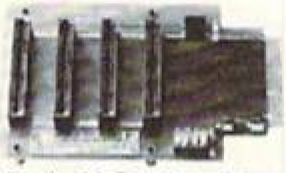
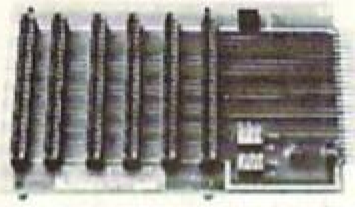
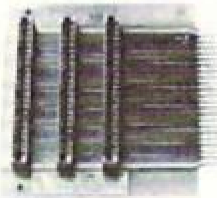
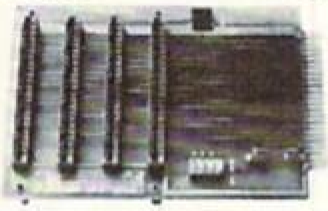
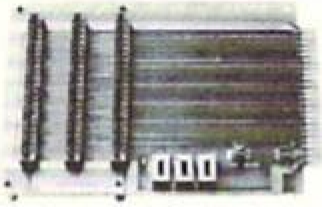

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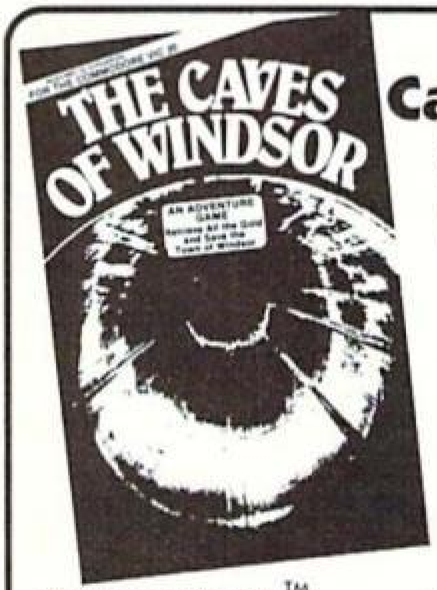

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Check-64

by Ron Cohen

This program was written as a response to the increasing demand for user-friendly, practical programs for home use on the Commodore 64. It will manage your checkbook, given the proper inputs.

Withdrawals should be input as negative numbers. All user input should be numeric, except for the memo, which can be up to 15 characters.

The program will run on the VIC 20 as well, if you take out the POKEs in line 30 and adjust the checkbook output section so it spans 22 columns instead of 40. **C**

Check-64

```
10 DIM A$(4,10)
20 PRINT"[CLEAR,BLACK]"
30 POKE 53281,1:POKE 53280,2:PRINT
40 PRINT"[DOWN5,RIGHT7]COMMODORE-64[SPACE]CHECKBOOK"
50 FOR I=1 TO 2500:NEXT:PRINT"[CLEAR]":GOSUB 500
51 REM *******************************
52 REM *      INITIALIZATION         *
53 REM *           AND               *
54 REM *          SETUP              *
55 REM *******************************
60 A$(1,1)="MEMO":A$(2,1)="CHK.[SPACE]#"
70 A$(3,1)="AMT."
80 INPUT"STARTING[SPACE]BALANCE[SPACE]$";A$(4,1)
90 INPUT"#[SPACE]OF[SPACE]ENTRIES";N
100 PRINT A$(1,1)TAB(15)A$(2,1)"[SPACE2]"A$(3,1)"[SPACE5]
    BALANCE"
101 REM ******************************
102 REM *        INPUT DATA          *
103 REM *            AND             *
104 REM *       TRANSACTIONS         *
105 REM ******************************
110 FOR J=2 TO N+1
120 I=1
130 PRINT"TRANSACTION[SPACE]#[SPACE]"J-1
140 INPUT"MEMO";A$(I,J)
150 I=I+1
160 INPUT"CHK.[SPACE]#";A$(I,J)
170 I=I+1
180 INPUT"AMOUNT[SPACE2]$";A$(I,J)
181 REM ******************************
182 REM *      CONVERT DATA          *
```

```
183 REM *           AND              *
184 REM *     COMPUTE BALANCE        *
185 REM ******************************
190 X=VAL(A$(I,J))
200 Y=VAL(A$(4,J-1))
210 A$(4,J)=STR$(Y+X)
215 IF VAL(A$(4,J))<>0 THEN 217
216 PRINT"[CLEAR,DOWN4]YOU[SPACE]HAVE[SPACE]NO[SPACE]
    MONEY[SPACE]LEFT...DEPOSIT[SPACE]SOME!"
    :FOR D=1 TO 5000:NEXT:PRINT"[CLEAR]
217 IF VAL(A$(4,J))<0 THEN GOTO 285
220 NEXT J
221 REM *******************************
222 REM *         CHECKBOOK           *
223 REM *           OUTPUT            *
224 REM *******************************
230 PRINT"[CLEAR,DOWN]"A$(1,1)TAB(15)A$(2,1)"[SPACE2]
    "A$(3,1)"[SPACE5]BALANCE"
235 PRINT"[SHFT O,CMDR Y14,SHFT O,CMDR Y5,SHFT O,CMDR Y6,
    SHFT P,CMDR Y10,SHFT P]"
240 FOR J=2 TO N+1
250 PRINT A$(1,J)TAB(15)A$(2,J)TAB(22)A$(3,J)TAB(30)A$(4,
    J)
260 PRINT:NEXT J
270 PRINT"[SHFT L,CMDR P14,SHFT L,CMDR P5,SHFT L,CMDR P6,
    SHFT @,CMDR P10,SHFT @]"
275 PRINT"STARTING[SPACE]BALANCE[SPACE4]FINAL[SPACE]
    BALANCE"
276 PRINT TAB(4)"$"A$(4,1)TAB(24)"$"A$(4,J-1)
280 END
285 PRINT"[CLEAR,DOWN5,RIGHT6]INSUFFICIENT[SPACE]FUNDS"
    :FOR DE=1 TO 5000:NEXT DE
300 PRINT"[CLEAR]":GOTO 120
400 REM *******************************
401 REM *         CHECKBOOK           *
402 REM *         PROCEDURE           *
403 REM *       INSTRUCTIONS          *
404 REM *******************************
500 PRINT"[DOWN5,RIGHT2]INPUT[SPACE]WITHDRAWALS[SPACE]AS
    [SPACE]NEGATIVE[SPACE]NUMBERS"
505 PRINT"[DOWN2,RIGHT2]INPUT[SPACE]NUMBERS[SPACE]ONLY
    [SPACE]EXCEPT[SPACE]FOR[SPACE]MEMOS"
510 FOR DE=1 TO 6500:NEXT:PRINT"[CLEAR]":RETURN
```

Machine Language for Beginners

by Richard Mansfield
Published by COMPUTE! Books
Reviewed by Danny Byrne

"There are going to be a million machine language programmers out there!" was my first reaction when I finally broke down and bought another book on machine language, after swearing "Never again!". I just wish that *Machine Language for Beginners* had been released a few months earlier. It might have saved me a lot of hair pulling and agonizing moments, trying to learn things that most of the other books assumed I already understood. Not to mention the money I might have saved (well over $100 worth of ML books clutter my shelves).

Machine Language for Beginners by Richard Mansfield, is just that: FOR BEGINNERS. Although there are several very well written books on programming with the 6502 instruction set in machine language, they all pre-suppose an intimate knowledge of your computer's innards and of the microprocessor. So where in the world does a beginner go to obtain this arcane knowledge? After all, these days people usually buy computers with keyboards and built-in languages that don't require knowledge of a particular microprocessor's instruction set. Years ago, when computers were as big as horses and could only be programmed via a maze of switches, machine language was the standard, mainly because BASIC, COBOL, etc., were not invented yet. Unfortunately, most of the fellows who have been writing 6502 machine language books seem to think that most of their readers were introduced to computers during that era, and for the average person to learn ML from them, the bookstores need to retail an instructor on a neighboring rack! Until they do, I highly recommend *Machine Language for Beginners* as your first introduction to the world of machine language.

The best way to use Mansfield's book is to begin at the beginning, even if you already understand some machine language concepts. The author includes many analogies to aid in understanding exactly what is happening inside the microprocessor. For instance, in Chapter 2 he writes: "The difficulty of learning ML has sometimes been exaggerated. There are some new rules to learn and some new habits to acquire. But most ML programmers would probably agree that ML is not inherently more difficult to learn than BASIC."

Because so many people who buy computers today are using some version of BASIC, the author has included a section on BASIC commands and their machine language equivalents. This is the section that I find the most pleasing. After all, the best way to learn anything is to find its relational aspects, and believe me, BASIC is more than just related to machine language—it was written with it.

One of the hardest BASIC concepts for me to learn, way back when (1982), was FOR-NEXT loops and time delays. It took awhile to understand what nesting was and that looping was another form of indexing. When I saw the same FOR-NEXT-STEP statement in this book I thought to myself "Not again!" But after I read a little it soon became clear. Once I understood the BASIC version, it was only a matter of redefining a few rules. The ML versions work the same, in principle, except you're using registers for the counter variable. At first, the idea of addressing might seem strange or difficult, but with a little practice using the examples it will soon become second nature to you.

Included are memory maps for most computers that have 6502 CPUs, as well as an assembler, disassembler, and ML moniter that can be typed in. Computer-specific adjustments are explained. Typing in each of these will give you the necessary tools to put you well on your way to writing ML programs. The author does not belittle the importance of BASIC, but points out that wherever you need speed in your programs, use ML. The mixture of the two will enhance your skills at producing powerful programs.

In closing, all I can say is READ ON (if only it had been out sooner...)

C

Stimulating Simulations for the VIC

by C. W. Engel
Published by Hayden Publishing
Reviewed by Jim Gracely

Stimulating Simulations for the VIC ***is available from Commodore as part of a four-book set that is excellent for both beginners and more advanced users of the VIC 20. The other books in the package are*** **VIC Revealed, VIC Graphics** ***and*** **VIC Games,** ***all by Nick Hampshire, all published by Hayden Books.***

For many years now you have heard rumors of large quantities of gold hidden in a maze of caves whose connecting passageways lead deep beneath the earth of an occasionally active volcano. The stories tell of monsters and demons who roam through the caves, poisonous gas, tremors from the volcano, and one man who returned from these perils alive and named the caves The Devil's Dungeon.

This is the introductory paragraph to the description of the most stimulating and elaborate simulation in this book. I don't know about you, but this kind of talk makes me want to jump up, grab my scimitar and leap onto the back of my trusty Arabian battle stallion. Anyway…

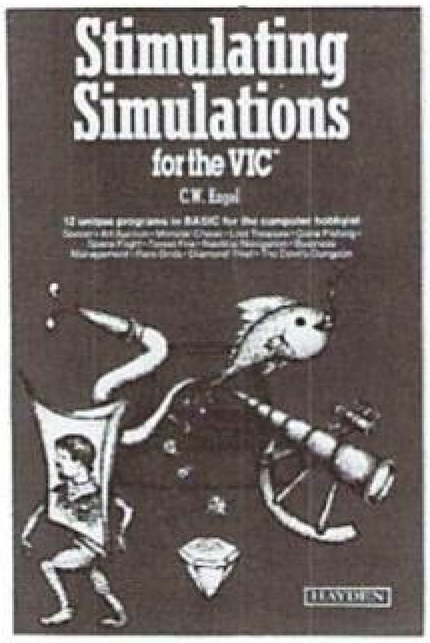
This is a book about *writing* simulations. Simulations are indeed a hot software item right now, and include everything from lemonade stands through fantasy role-playing games. In this book, the simulation writer is presented with the concepts and programming techniques necessary to effectively stimulate the game player. That sounds like quite a mouthful, but mostly what it means is that this is a how-to book.

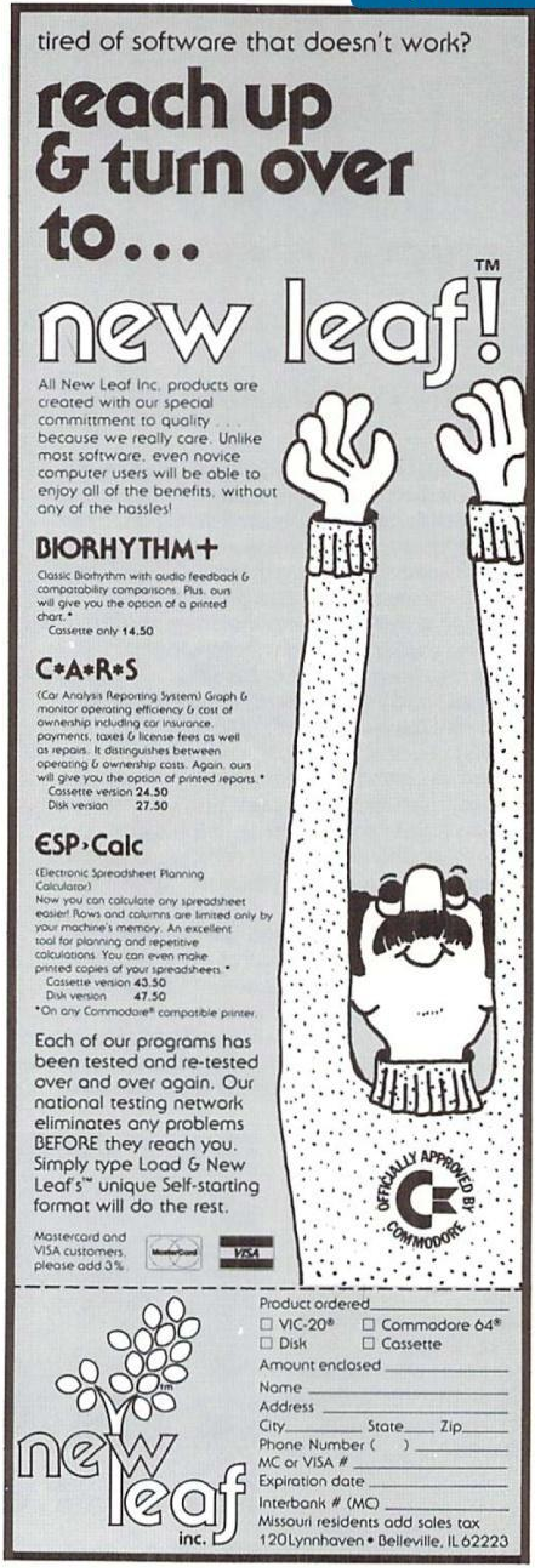
Stimulating Simulations presents 12 programs ranging from rare bird watching to dungeon spelunking. In between these two ends are programs such as Forest Fire, Diamond Thief, and Art Auction. I must compliment Mr. Engel on the documentation for these programs. Each program has a variable listing, a complete flowchart, including references to program line numbers, comments on possible modifications to the program and suggestions for expanding the ideas presented. This documentation greatly enhances the program listings and keeps the reader involved with something more than simply entering lines of BASIC.

I should add right about now that this book assumes that the person reading it has a good understanding of BASIC. It does not provide a line-by-line description of what each program is doing. At the same time simulation programs don't contain the tricks and crunching that many graphic game programs must, and perhaps this book could help a beginning programmer understand the fundamentals of programming.

The only problem I found with the book is the unfortunate selection of a soccer game simulation in the introduction. The text of the introduction is very good, explaining to the writer how to create a setting and goal for a simulation and includes many good ideas for programs. However, the soccer game program misses its mark, and at best is a sluggish example of what a simulation is not. If you want to get a feel for playing the simulations, skip this program listing and begin by typing in Art Auction or Monster Chase.

I give this book good marks overall and would recommend it to anyone interested in the "how do they do that" or better yet the "how can I do that" of simulations. C





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glitch fix

"The Commodore 64 Skiffle Band" by Jim Butterfield

Spring, 1983

We are guilty of omitting line 300 from Jim's program listing, which plays the first note of the tune "Dixie." Here's the missing line:

```
300 DATA 10,51,97,0,0,0,0
```

"VIC Super Piano" by Myron Miller

Spring, 1983

Myron writes:

I am writing to report some errors that appear in the published program listing for "Super Piano". I found the following errors.

Line 220

Published:

```
220 PRINT" R: REPLAY TUNE"," X:EXIT M OR
    R ABOVE"," S: SAVE TUNE ON TAPE"
```

Original

```
220 PRINT" R: REPLAY TUNE"," X: EXIT M OR
    R ABOVE"," S: SAVE TUNE ON TAPE"
```

The published version will not print a space between "X:" and "EXIT" in the key guide.

```
        Line 245
Published:
245 PRINT"PRESS ANY KEY TO CONT";

Original:
245 PRINT:PRINT" PRESS ANY KEY TO
    CONT";
```

The original version prints a blank line in between the last instruction and the "PRESS ANY KEY" message, and prints a space between the border and "PRESS". The published version does not.

```
        Line 255
Published:
255 POKEV,15::PRINTCHR$(147)

Original:
255 POKEV,15:PRINTCHR$(147)
```

Extra colon, no real problem.

```
        Line 330
Published:
330 PRINTCHR$(19)BL$CHR$(19)

Original:
330 PRINTCHR$(19)BL$,BL$CHR$(19)
```

The purpose of this line is to erase the messages that appear at the top of the screen after a key is pressed. The original version will erase the top two lines. The published version erases only the top line. Thus the published version will erase "KEYBOARD READY", but leaves "NO TUNE IN MEMORY" or "TUNE MEMORY FULL" on the screen.

```
        Line 335
Published:
335 IFA$="X"THENM=0::Q=0:GOSUB
    1000:GOTO305

Original:
335 IFA$="X"THENM=0:Q=0:GOSUB
    1000:GOTO305
```

Extra colon, no real problem.

```
        Line 355
Published
355 IFM=1ORR=1THEN310

Original:
355 IFM=1 OR R=1THEN315
```

The original program, by returning to line 315, will allow only the number keys (notes), function keys (octaves), and carriage return to be memorized. The published program, by returning to line 310, allows any key to be memorized, and will attempt to play back meaningless key closures.

```
        Line 435
Published:
435 PRINT" "CHR$(18)CHR$(OC%(FK))CHR$
    (146):GOTO310

Original:
435 PRINT" "CHR$(18)CHR$(OC%(FK))CHR$
    (146);:GOTO310
```

When using the print feature, the published program will start printing on a new line each time that an octave (function key) is selected. The original program uses the semicolon to keep the printout on the same line. **C**

"Phone Home" Program Listing

Spring, 1983

Line 420 should be:

```
420FORJ=1TO2:FORK=1TO50
```

new products

Company:
Softron, Inc.
2067 Broadway, Suite 27
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Integrated Controls
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RAK Electronics
P.O. Box 1585
Orange Park, FL 32067-1585
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Price: $19.95 plus $2.00 shipping and handling

Company:
Smoky Mountain Software
54 West Main Street
Brevard, NC 28712
704-883-2595

Product:
Bible Trip—Bible educational program for the Commodore 64. Uses color graphics, sound and animation. Your space ship is caught in a time warp and you find yourself in Palestine during the first century. For sixth grade through adult.
Price: Tape $9.95; disk $14.95

Company:
Bubble Bus
87 High Street
Tonbridge, Kent TN1 1LS
England

Product:
Hustler—Pool-type game for the Commodore 64. Written in machine code, with sprite graphics and music. Six possible games for one or two players.
Price: Contact company

Company:
Reilly Associates
P.O. Box 17144
Rochester, NY 14617

Product:
BounceAround—Action strategy game for the VIC 20. Use the keyboard to control a fast-moving ball. Hit the targets, but avoid the Voids, which swallow the ball. Requires either 3K expander or Super Expander.
Price: Tape $9.95

Company:
Programmers Guild
P.O. Box 220
LaCrescent, MN 55947

Product:
Sub Rescue—Action strategy game for the Commodore 64. Rescue the stranded divers, but beware of the Death Ship, mines and more. Return your cargo safely to Atlantis for more ammunition.
Price: Tape $24.95

Company:

Brøderbund Software
1938 Fourth Street
San Rafael, CA 94901

Product:

Cartridge games for the VIC 20—In *AE* you must eliminate the hordes of robot sting rays. Increasingly difficult levels of play, four different three-dimensional screens. *Sky Blazer* is the World War III aircraft you pilot to destroy the defenses and headquarters of the Bungleing Empire. Both are joystick controlled.
Price: $39.95 each

Product:

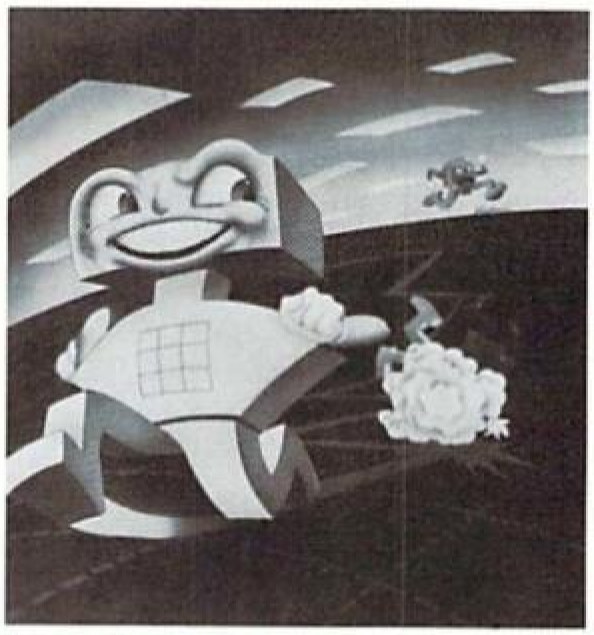
Cartridge games for the Commodore 64—*Choplifter!* features realistic throttle action as you try to rescue hostages from behind enemy lines in your helicopter. Animation and 3-D graphics. *Serpentine* is an arcade action game with 20 levels of play. You are a snake who must destroy the giant serpents. Both use joystick.
Price: *Choplifter!* $44.95; *Serpentine* $39.95

Company:

Tronix Publishing, Inc.
8295 S. LaCienega
Inglewood, CA 90301
213-215-0529

Product:

Games on disk for the Commodore 64—*Juice,* a strategy game, has six levels of play, each with three rounds plus a bonus round. Points are earned as Edison, the main character, completes circuit boards while he avoids the Killerwatts and other characters. In *Kid Grid,* the Kid must connect all the dots before the four bullies catch him. He also must watch out for the bouncing question mark.
Price: $34.95 each



Kid Grid from Tronix

Company:

Pagemate, Inc.
8166 E. 44th Street
Tulsa, OK 74145
918-627-7440

Product:

Pagemate®—A bookholder and typing easel designed to accommodate almost any size book, programming manual, periodical or loose pages. It is designed to keep pages in place, yet allow pages to be turned easily. Adjustable to any angle. Available accessories include "Line-a-timers" for easy line location reference and hard cover extenders for hard cover or thick books.
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TravelMaster Model TCC 2360

Company:

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Division of Southern Case, Inc.
2315 Laurelbrook Street,
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Product:

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Product:

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Company:

Programmers' Pipeline
P.O. Box 666
Glendora, CA 91740
213-914-4317

Product:

Checklist for Program Authors—A leaflet that walks new programmers (or maybe even experienced ones) through the steps of preparing a program for marketing, right down to reminding you to mark any program you send through the mail with a "Magnetic Medium!" warning. Price: Free with the mention of *Power/Play* and a stamped, self-addressed envelope.

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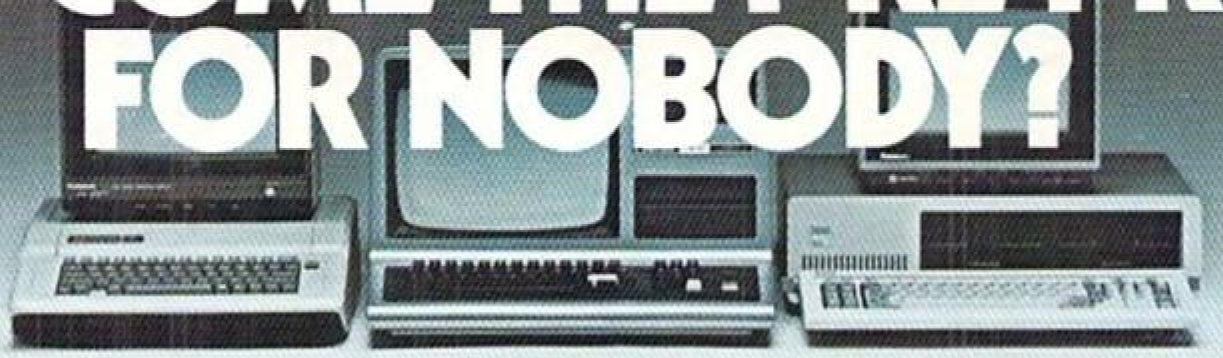

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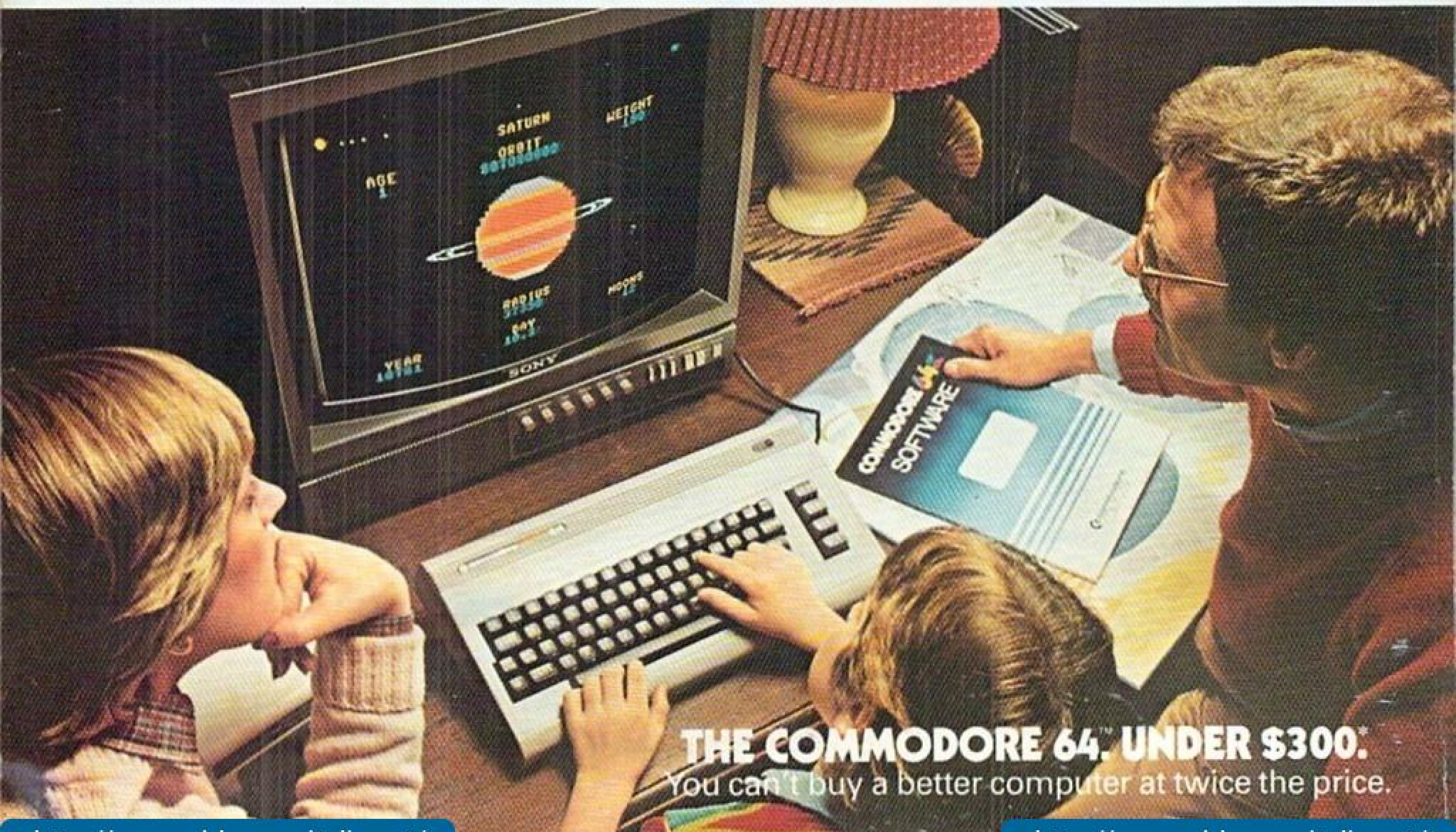

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